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VOLUME 8, NUMBER 7 APRIL 1, 1975 SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED

WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior



VOLUME 8, NUMBER 7 APRIL 1, 1975

W75-03301 - W75-03850

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the Water Resources Thesaurus. Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCU-MENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center Office of Water Research and Technology U.S. Department of the Interior Washington, D. C. 20240

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SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOM-PONENT AQUEOUS SOLUTIONS,

Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique. For primary bibliographic entry see Field 2K. W75-03540

THERMODYNAMIC PROPERTIES OF SEA SALT SOLUTIONS,

California Univ., Berkeley. Dept. of Chemical Engineering. For primary bibliographic entry see Field 2K. W75-03808

2. WATER CYCLE

2A. General

HYDROLOGIC SIMULATION OF A COMPLEX WATERSHED,

Washington State Univ., Pullman. Coll. of En-

gineering.
H. D. Copp, D. T. Higgins, and G. T. Thompson.
Presented at Ninth American Water Resources
Conference, October 1973, Seattle, Washington,
Honolulu, Hawaii. 23 p, 11 fig. OWRT B-036WASH(2), B-043-WASH(1), and B-050-WASH(1).

Descriptors: *Washington, *Watersheds(Basins), Systems analysis, Decision making, *Simulation analysis, Hydrology, Planning, River basin development, *Model studies.

Identifiers: *Yakima basin(Wash).

In the summer of 1970, a program to develop simulation models and to perform certain systems analyses on the Yakima basin was funded. The fundammental intent of three year's research was to develop river basin planning methodology for water and related land resources. Once the techniques were available, they could be used to examine various aspects of resource management. We were not interested in making decisions on how to best manage these resources in the Yakima basin. That is best left to the government agencies, to local basin planners and to the public who are directly affected by resource management. The methodology would be used by the decisionmakers to arrive at rational plans. A hydrologic model was developed which will aid planners and decision makers in analyzing impacts of future water management in rather complex watersheds. W75-03325

THE PROBLEM OF DETERMINING THE MAX-IMUM STORM RUNOFF YIELD IN SMALL RIVERS (IN PROBLEMA DETERMINARII DEBITELOR MAXIME DIN PLOI PE RIURI

MICI), Institutul Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).

Hidrotechnica, Vol 19, No 5, p 236-241, 247, May, 1974. 2 fig, 2 tab, 15 ref.

Descriptors: *Mathematical models, *Storm water, *Storm runoff, Rivers, Climates, *Forecasting, Model studies. Identifiers: *Romania.

The determination of the maximum storm runoff yield in small rivers is based on the utilization of the maximum runoff modality from the reductional equation, worked out for 7 various climatic zones, depending upon the climatic conditions of Romania. Seven series of module values were transposed by using known empirical values. Thus, the maximum yield in percent and cu m/sec equals the elementary maximum runoff, or the maximum intensity of water replacement in cu m/sec sq km multiplied by the receiving surface in sq km, divided by the receiving surface plus 1 to the n power. The maximum elementary runoff must be determined, considering the other parameters as known. The n parameter varies from 0.46 in the southwestern zone of the Southern Carpathians to 0.55 in the southern part of the Transylvania Plateau. The empirical accuracy of the series was calculated according to the equation: P security value in percent equals m, the number of the values in the series, divided by n, the number of the yrs of the series plus 1, all multiplied by 100 percent. In order to prolong the series of maximum yields for as long a period of time as possible, 7 climatically similar zones were delineated. The method presented permits the determination of maximum storm runoff yields in small rivers without using the statistical parameters Cv and Cs. (Takacs-FIRL) W75-03535

BINARY TREE MODEL SIMULATION OF THE BEHAVIOR OF URBAN HYDROLOGIC

Nebraska Univ., Lincoln. Dept. of Computer Science.

A. J. Surkan, and P. Kelton.

International Journal of Systems Science, Vol 5, No 7, p 639-653, July, 1974. 9 fig, 3 ref.

Descriptors: "Urban hydrology, "Hydrograph analysis, Model studies, Data analysis, Flow, Ex-periments, "Networks, "Maryland. Identifiers: "Baltimore(Md).

A simulator of urban hydrologic networks was designed based primarily on geometric descrip-tors. Its application is demonstrated using data from the Northwood Gaging Installation in Bal-timore, Maryland. The simulator incorporates a binary tree model of the network, a polygon representation of the storm geometry, and time-varying rainfall intensity to produce simulated hydrographs of flow. Simulated hydrographs and experimental runoff graphs are compared. (Prague-FIRL) W75-03541

THE COASTAL UPWELLING CYCLE ON A BETA-PLANE: HYDRODYNAMICS AND THER-

Florida State Univ., Tallahassee. Dept Meteorology. For primary bibliographic entry see Field 2L. W75-03642

'PROJECT AQUA' IN POLAND, (IN POLISH), Polskie Towarzystwo Przyrodnikow im. Koper-nika, Warsaw.

Kosmos (Warsaw), Vol 22, No 2, p 147-152, 1973. Rosinos (Warsaw), Vol. 22, No.2, p. 147-12, 1975. Identifiers: Legal aspects, *Limnology classification, *Poland, Projects, Classifications, *Project Aqua, International Biological Program.

'Project Aqua' was created in 1959 during the 14th Session of the International Society of Limnolo-gists for the purpose of selecting fresh water bodies of special interest or value in the world, which would be under special care and legal protection. The following water bodies in Poland v earmarked for inclusion in the project: Lakes Wd-zydze, Leba, Sniardwy, Luknajno, Mikolaijki, Mamry, Tajty, Jeziorak, Czarne, Wigry, Hancza, Tatra Mountains Lakes, Goczakowo and 2 rivers, Dunnieg and Dunner Chamaton. Dunajec and Drweca. Characteristic data for each of the mentioned bodies are given. The above list is not closed and will be corrected and supplemented as progress is made in Poland in hydrobiological studies on other water bodies. 'Project Aqua' falls under the International Biological Program.—Copyright 1974, Biological Abstracts, Inc. W75-03843

2B. Precipitation

A ONE-DIMENSIONAL NUMERICAL MODEL OF PRECIPITATION SCAVENGING WITH AP-PLICATION TO RAINOUT OF RADIOACTIVE DEBRIS.

California Univ., Livermore. Lawrence Livermore Lab.

For primary bibliographic entry see Field 5B. W75-03427

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE.

RAND Corp., Santa Monica, Calif.

R. R. Rapp, and M. Warshaw. Available from the National Technical Information Service, Springfield, Va. 22161, as AD-780 652, \$3.75 in paper copy, \$2.25 in microfiche. Publication No R-1415-ARPA, March 1974. 40 p, 12 fig, 3 tab, 17 ref, 1 append. DAHC15-73-C-0181.

Descriptors: *Climates, *Evaporation, *Computer models, Simulation analysis, Precipita-tion(Atmospheric), Winds, Deserts, Lakes, Africa, Moisture, Statistical methods. Identifiers: *Inadvertent climate changes, *Sahara

lakes. Moisture flux.

The results of simulating the addition of a large body of water to the Sahara desert using the Rand version of the Mintz-Arakawa general circulation model were described. The simulated lake is a relacondition and was chosen to test the hypothesis that an observable and statistically significant change would be produced in the local circulation. By observing the moisture flux and moisture flux divergence as a function of the lake addition, a re-gion was selected in which to test the hypothesis that the precipitation was altered. A significant change in precipitation was subsequently observed over the chosen area. Similarly, a significant wind direction shift in the lower (800-mb) level of the model was found. Speculation on how these simu-lated results might be used to predict the actual change in the climate was also given. (Schickedanz-ISWS) W75-03635

MEASUREMENT OF ATMOSPHERIC PRECIPITABLE WATER USING A SOLAR RADIOMETER.

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. D. E. Pitts, W. McAllum, and A. E. Dillinger. Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as N74-19983, 33.75 in paper copy, \$2.25 in microfiche. Technical Memorandum X-58129, February 1974. 27 p, 7 fig, 1 tab, 23 ref.

Descriptors: *Precipitable water, *Solar radiation, *Statistical methods, Remote sensing, Water vapor, Absorption, Least squares method, At-mosphere, Radiosondes, Measurement. Identifiers: *Solar radiometer, Atmospheric profiles, Transmission(Atmospheric), Spectral

A technique was described and tested that allows the determination of atmospheric precipitable water from two measurements of solar intensity: one in a water-vapor absorption band and another in a nearby spectral region unaffected by water vapor. Measurements of total atmospheric water

Field 2-WATER CYCLE

Group 2B—Precipitation

vapor were accomplished by determining the ratio of a water-vapor absorbing region (0.9435 micrometer) to a clear channel (0.8730 micrometer). Aerosol extinction is usually a slowly varying function of wavelength in the visible and near in-frared. This ratio effectively eliminates the aerosol and Rayleigh scattering leaving only the watervapor absorption effects. Because a small amount of water vapor may saturate the strong water bands and a large amount of water vapor may not saturate the weak bands, this ratio is neither a linear nor an exponential function of precipitable water. (Jones-ISWS) W75-03638

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITA-TION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2, North American Weather Consultants, Goleta, Calif.

For primary bibliographic entry see Field 3B.

W75-03639

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTA-TIVE BASIN,

Swedish Meteorological and Hydrological Inst., Stockholm.

For primary bibliographic entry see Field 2I. W75-03654

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAIN-

Institute for Agricultural Research, Zaria (Negeria).

J. M. Kowal, W. Kijewski, and A. H. Kassam. Agric Meteorol 12(2): 271-280, Illus. 1973.

Descriptors: *Rainfall intensity, Rainfall, Rain, Precipitation(Atmospheric), Equipment, *Soil erosion, Surface runoff, *Electrical equipment, Storm runoff, Storms. Identifiers: Nigeria.

A simple apparatus is described for evaluating the energy load and intensity of rainstorms relevant to studies of soil erosion and surface runn-off. The instrument records graphically, on a time scale, the amplitude of electric pulses originating from the impact of raindrops on the surface of a transducer disc, by making use of the piezo-electric effect. The size distribution of raindrops is calculated by analysing the graphic records of pulses on the chart from the number and the amplitude of pulses, and from the measured volume of total rainfall. The apparatus can be assembled using commercially available materials and recorders. It combines easy handling with acceptable accuracy.--Copyright 1974, Biological Abstracts, Inc. W75-03838

2C. Snow, Ice, and Frost

USING AERIAL MEASUREMENTS OF FOREST OVERSTORY AND TOPOGRAPHY TO ESTI-MATE PEAK SNOWPACK,

Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. F. R. Larson, P. F. Ffolliott, and K. E. Moessner. Forest Service Research Note RM-267, July 1974. 4 p, 2 fig, 1 tab, 8 ref.

Descriptors: *Snowpacks, *Water equivalent, *Snow surveys, *Aerial photography, Forests, Canopy, Topography, Slopes, Data collections, Remote sensing, Pine trees, Watersheds(Divides).

It is possible to relate peak snowpack water equivalent measured on the ground to forest

overstory and topography attributes measured on aerial photographs. On sites where slope steepness and aspect vary widely and several forest overstory size and density classes are intermixed, only topographic attributes need be measured, and any of the tested photo scales (1:3,000; 1:6,000; 1:15,840) may be used. On nearly level sites where size and density classes are homogeneous, forest overstory attributes also must be measured, and the 1:15,840 scale is best. (Witt-IPC) W75-03570

ADVANCE OF THE GREENLAND ICE SHEET TO NORTH-EASTERN ELLESMERE ISLAND,

Alberta Univ., Edmonton. Dept. of Geography. J. England.

Nature, Vol 252, No 5482, p 373-375, November 29, 1974. 1 fig, 18 ref.

Descriptors: *Glaciation, *Glaciology, Glaciers, Arctic, Ice, Movement, Geology, Geomorpholo-

gy, Canada. Identifiers: Greenland ice sheet, Ellesmere Island.

Geological evidence suggests that an important restricted ice advance occurred along northwestern Greenland and northeastern Ellesmere Island during the last glaciation. Detailed records of multiple glaciations and sea level changes are preserved along the coastlines of Smith Sound, Nares Strait, and Kennedy and Robeson channels. At present the advance of the Greenland Ice Sheet on to northeastern Ellesmere Island is considered inconclusive and, if it did occur, it would have to pre-date the late Wisconsin, and possibly the entire Wisconsin, glaciation. Evidence from glacial geology is also critical for the reconstruction of the time profiles through existing and future ice cores in the region as such data will directly affect the parameters in the flow models chosen. If the ice sheets in the High Canadian and Greenland Arctic were relatively inactive during the last glaciation or glaciations then the ice cores obtained from these areas may be older than originally expected. The chronology of glacial activity during the late Quaternary is, therefore, an important source for both the dating and palaeoclimatic interpretation of the ice cores. (Humphreys-ISWS) W75-03645

EFFECTS OF OIL UNDER SEA ICE, Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab. L. S. Wolfe, and D. P. Hoult. Journal of Glaciology, Vol 13, No 69, p 473-488, 1974. 8 fig, 12 ref. DOT-CG-12438-A.

Descriptors: *Laboratory tests, *Sea ice, *Oil spills, Laboratory equipment, Water pollution sources, Ice, Evaluation, Arctic, Analytical techniques, Oil pollution, Testing procedures.

Identifiers: Ice-oil interfaces.

Laboratory research was performed to determine the effects of crude and diesel oils on the porous sub-structure of Arctic sea ice. A qualitative description was given of what occurs when oil is placed under the ice and an evaluation of some quantitative measurements was made to determine the maximum extent to which crude oil can spread in an Arctic environment. The extent of the entrapment of oil in the ice-brine matrix was negligible. Even when the porosity of the ice increases markedly during pre-melt conditions, the volume of oil entrapped remains small. The ice does not in any way grow through the oil. The oil is neatly pocketed by the ice as more ice proceeds to form under it. The presence of an oil pool under the ice causes a marked change in the temperature distribution in the ice because the oil pool acts as an insulating layer between the cold air and the relatively warmer sea water. If the crude oil spilled is from a supertanker of 100,000 metric tons capaci-ty, the total volume of oil will be 113,000 cu m and

the total area over which it will spread was calculated to be a maximum of 45 sq km (17 square miles), a minimum of 9 sq km (4 square miles) and 'best' estimate of 17 sq km (6 square miles). Even the largest of these values is considerably smaller than the area over which such a spill would spread in temperate waters. All of these conclusions apply to conditions typical for first-year sea ice. (Humphreys-ISWS) W75-03646

OBSERVATIONS ON THE INTERNAL STRUCTURE AND ORIGIN OF SOME FLUTES IN GLACIO-FLUVIAL SEDIMENTS, BLOM-NORTH-WEST STRANDBREEN. SBERGEN.

Univ. of East Anglia, Norwich (England). School of Environmental Sciences.

M. A. Paul, and H. Evans. Journal of Glaciology, Vol 13, No 69, p 393-400, 1974.7 fig, 5 ref.

*Glaciation, Descriptors: *Geomorphology. *Glacial sediments, On-site investigations, Glaciology, Ice, Tunnels, Glacial soils, Fluvial sediments.

Identifiers: Blomstrandbreen(Spitsbergen), *Flutes

Some flutes which occur on the surface of a series of glacio-fluvial sediments at the margin of Blom-strandbreen, north-west Spitsbergen, were described. A section in one has revealed a complex internal structure, in which originally horizontal beds have been folded into an anticline whose axis is normal to the ice margin, and whose structure is related to the morphology of the flute. Comparison of the observed deformation with the theoretical distribution of stresses around the base of a subglacial tunnel showed that this deformation could have resulted from flow under such a stress system. These observations support the hypothesis that flutes are formed when unfrozen, water-soaked materials deform subglacially due to the pressure differences that exist in the vicinity of an tion to ice flow. (Humphreys-ISWS) W75-03647 ice tunnel formed in the lee of some rigid obstruc-

NUCLEATION AND GROWTH OF BUBBLES AT AN ICE-WATER INTERFACE,
Nevada Univ., Reno. Lab. of Atmospheric

Physics.

S. A. Bari, and J. Hallett.

Journal of Glaciology, Vol 13, No 69, p 489-520, 1974. 25 fig, 4 tab, 23 ref, 1 append. NSF Grant

Descriptors: *Ice-water interfaces, *Laboratory tests, *Bubbles, *Nucleation, Ice, Freezing, Gases, Air, Helium, Growth rates, *Crystal growth, Evaluation, Laboratory equipment.

Nucleation and growth of bubbles during freezing Nucleation and grown or outsies during ircezing of solutions of air and helium in water were investigated experimentally by using different techniques to give freezing rates between 1 micrometer/sec and 10 mm/sec. Bubbles grow as cylinders below 5 micrometer/sec and become egg shaped, with the narrow ends towards the freezing interface, at higher ice growth velocities. Bubble concentration increases and size decreases with increase of growth rate. The detail of bubble size and concentration is influenced appreciably by the particulate content of the water sample. Very high freezing rates give initially clear ice. Subsequently, bubbles nucleate and grow at grain boundaries within the ice. Bubbles do not move with recrystallization and their spatial distribution shows the grain boundary positions at the time of nucleation. Observations were interpreted in terms of nucleation on particles in suspension in the water and a significant incorporation of air molecules into the ice lattice. Bubble nucleation and growth at a growing ice-water interface is characterized by the initial air concentration, by

the water particulate content, and by the growth rate. Deduction of growth conditions from air bubble characteristics may be achieved subject to the uncertainty caused by the variable particulate content. (Humphreys-ISWS)

DIFFERENTIAL SEA-ICE DRIFT. I. SPATIAL AND TEMPORAL VARIATIONS IN SEA-ICE DEFORMATION, Cold Regions Research and Engineering Lab.,

Hanover, N.H.

W. D. Hibler, III, W. F. Weeks, A. Kovacs, and S. F. Ackley.

Journal of Glaciology, Vol 13, No 69, p 437-455, 1974. 10 fig, 4 tab, 17 ref. NSF Grants AG-344 and

Descriptors: *Sea ice, *On-site investigations, *Deformation, Movement, Ice, Velocity, Dynamics, Evaluation, Investigations, Analytical techniques, Mathematical studies, Mathematical models, Least squares method. Identifiers: *Drift(Sea ice), *Beaufort Sea.

Measurements of mesoscale sea-ice deformation over a region approximately 20 km in diameter were carried out over a five-week period in the spring of 1972 at the Beaufort Sea. They have been analyzed to determine non-linearities in the ice velocity field (due to the discrete small-scale nature of the ice pack), as well as a continuum mode of deformation represented by a least-squares strain-rate tensor and vorticity. The deformation-rate time series between Julian day 88 and 112 exhibited net areal changes as large as 3% and deformation rates up to 0.16% per hour. In the principal axis coordinate system, the strain-rate typically exhibited a much larger compression (or extension) along one axis than along the other. Persistent cycles at approximately 12 h wavelengths were observed in the divergence rate. A com-parison of the average residual error with the average strain-rate magnitude indicated that strains measured on a scale of 10 km or greater can serve as a valid measure of the continuum motion of the sea ice. This conclusion was substantiated by a comparison between the mesoscale and macroscale deformation measured over an appack-ice rotation, vorticity calculations indicate that at low temporal frequencies (0.02/h), the whole mesoscale array rotates as an entity, and consequently, the low-frequency vorticity can be floe. (See also W75-03650) (Humphreys-ISWS)

DIFFERENTIAL SEA-ICE DRIFT. II. COM-PARISON OF MESOSCALE STRAIN MEA-SUREMENTS TO LINEAR DRIFT THEORY PREDICTIONS,

Cold Regions Research and Engineering Lab., Hanover, N.H. W. D. Hibler, III.

Journal of Glaciology, Vol 13, No 69, p 457-471, 1974. 5 fig, 2 tab, 18 ref, 1 append. NSF Grants AG-344 and AG-492.

Descriptors: *Sea ice, Movement, *Theoretical analysis, "Strain, Equations, Mathematical stu-dies, Arctic, Atmosphere, Evaluation, Analytical techniques, Dynamics, Investigations. Identifiers: "Drift(Sea ice), Mesoscale.

A comparison of mesoscale strain measurements with the atmospheric pressure field and the wind velocity field indicates that the ice divergence rate and vorticity follow the local pressure and wind and vorticity follow the local pressure and wind divergence with significant correlation. For low atmospheric pressures and converging winds the divergence rate was negative with the vorticity being counter-clockwise. The inverse behavior was observed for high pressures and diverging winds. This behavior was shown to agree with predictions based on the infinite boundary solution of a linearized drift theory in the absence of gradient current effects and using the constitutive law proposed by Glen for pack ice. The best leastsquares values of the constitutive law viscosity parameters were approximately 10 to the 12th power kg/s. With typical divergence rates these values yield compressive stresses of the mag-nitude of 100,000 N/m which are similar to values suggested by the Parmerter and Coon ridge model. The infinite boundary solution of the linear drift equation indicates that in a low-pressure region that is reasonably localized in space, ice would be expected to converge for high compactness (winter) and diverge for low compactness (summer). Calculations were carried out with a general linear viscoelastic constitutive law that includes memory effects and a generalized Hooke's law as well as the Glen law as special cases. A best fit of this calculation with strain measurements indicated a better agreement with viscous behavior than with elastic behavior, and the frequency behavior of the estimated 'viscosities' similar to the Glen law behavior at temporal frequencies less than approximately 0.01/h. (See also W75-03649) (Humphreys-ISWS)

A STUDY OF GLACIER FLOW FOR AN OPEN-PIT MINE: AN EXERCISE IN APPLIED

GLACIOLOGY, Cold Regions Research and Engineering Lab., Hanover, N.H. S. C. Colbeck.

Journal of Glaciology, Vol 13, No 69, p 401-414, 1974. 12 fig. 8 ref.

Descriptors: *Glaciology, *Mathematical models, *Glaciers, Movement, Investigations, Flow, Ice, Velocity, Strain, Ablation, Equations, Feasibility studies, Project feasibility. Identifiers: *Greenland(Isua).

As part of the feasibility study for the development of an open-pit mine at the edge of the Greenland ice sheet, a study was made of the ice flow toward the proposed pit. The flow was analyzed by considering the two-dimensional flow along seven cross sections. The most favorable profile was determined for each cross section and its flow calculated. The excavation necessary to expose the ore is 106 million cu m of ice. In order to establish favorable profiles 66 million cu m of ice will have to be removed and an additional 7.9 mil-lion cu m of ice will have to be removed each year in order to prevent the glacier from thickening and advancing into the mine. Many other glaciological problems must be considered, and field work continues in order to provide more information about the area. (Humphreys-ISWS) W75-03663

MULTIVARIATE STATISTICAL ANALYSIS OF

GLACIER ANNUAL BALANCES, Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie. L. Lliboutry

Journal of Glaciology, Vol 13, No 69, p 371-392, 1974. 3 fig, 6 tab, 5 ref, 2 append.

Descriptors: *Glaciers, *Glaciology, *Statistical models, *On-site investigations, Mathematical models, Ablation, Analytical techniques, Stochastic processes, *Statistical methods, Model

Identifiers: Multivariate statistical analysis, Annual balances, Linear models.

A statistical analysis was made of the annual balances collected during 16 consecutive years at 32 sites on the ablation area of the Glacier de Saint-Sorlin (French Alps). Only 38% of the 32 times 16 balances are known; moreover, in 8 cases only the total balance for 2 consecutive years is known, and in one case the balance for 4 consecutive years. A comprehensive study of the errors led to the assumption of a linear model for the annual balance. A test of the linear model derived from Tukey's non-additivity test was positive. Although a much more general, non-linear model gives a better representation of 13 times 6 balances forming a complete table of data, the linear model with a standard error of about 0.20 m is good enough to be used in theoretical studies or in rou-tine work. (Humphreys-ISWS) W75-03664

AUTUMN, WINTER AND SPRING SOIL TEM-PERATURES IN OKSTINDAN, NORWAY, University Coll., Cardiff (Wales). Dept. of Geolo-

gy. C. Harris.

Journal of Glaciology, Vol 13, No 69, p 521-533, 1974. 7 fig, 3 tab, 12 ref.

Descriptors: *Soil temperature, *Surveys, *Onsite investigations, Temperature, Evaluation, Soil investigations, Instrumentation, Snow cover, Air temperature, Freezing, Thawing, Seasonal, Autumn, Winter, Spring. Identifiers: *Norway(Okstindan).

Soil temperatures were recorded over periods of several weeks in the years 1969 and 1970 at two sites to a depth of 100 cm. Snow depth was of major importance in the rate of freezing of the soil in winter: where snow cover was less than 5 cm in depth, freezing rates were almost double those where snow depth was over 1 m. Snow cover also insulated the soil surface from above-zero air temperatures during spring, and soil thawing com-menced from the surface only following the clearance of snow. Similarly, insulation of the soil surface by snow prevented short-term freezing and thawing cycles penetrating the soil, although even where snow cover was absent such shortterm cycles were not observed to penetrate the soil to depths in excess of 5 cm. This surficial freezing and thawing of the soil took place more readily in spring than in the autumn. The annual cycle of soil freezing and thawing was the dominant factor in the thermal regime of these soils, short-term freezing cycles affecting only the immediate surface soil layers. (Humphreys-ISWS) W75-03665

VARIATIONS IN THE SLIDING OF A TEM-

PERATE GLACIER,
Washington Univ., Seattle. Geophysics Program.

washington Univ., Seattle. Geophysics Program. S. M. Hodge.
Journal of Glaciology, Vol 13, No 69, p 349-369, 1974. 15 fig, 42 ref. NSF GU-2655. ONR N00014-67-A-0103-0007.

Descriptors: *Glaciers, *Glaciology, *On-site investigations, 'Washington, Ice, Surveys, Move-ment, Velocity, Evaluation, Surfaces, Slopes, Profiles, Temperate, Seasonal, Measurement, Identifiers: *Basal sliding, *Nisqually Glacier, Mount Rainier

Measurements of the positions of stakes along the center-line of the lower Nisqually Glacier were made over a two-year period. Variations in the basal sliding speed were calculated from the measured changes in surface speed, surface slope, and thickness, using the glacier flow model of Nye and allowing for the effect of the valley walls, longitudinal stress gradients, and uncertainties in the flow law of ice. The flow is mainly by basal sliding and has a pronounced seasonal variation of approximately + or - 25%. Internal deformation contributes progressively less to the total motion with distance up-glacier. Neither the phase nor the magnitude of the seasonal velocity fluctuations can be accounted for by seasonal variations in the state of stress within the ice or at the bed, and the variations do not correlate directly with the melt-water discharge from the terminus. A seasonal wave in the ice flow travels down the glacier at a speed too high for propagation by internal deformation or basal sliding. The rate of sliding is primarily deter-mined by the amount of water in temporary

Field 2-WATER CYCLE

Group 2C—Snow, Ice, and Frost

storage in the glacier. The peak in sliding speed occurs, on the average, at the same time as the maximum liquid water storage of the South Cascade Glacier. The data support the idea that glaciers store water in the fall, winter, and spring and release it in the summer. This temporary storage may be greatest near the equilibrium line. The amount of stored water may increase over a period of years and be released catastrophically as a jokulhlaup. Any dependence of sliding on the basal shear stress is probably masked by the effect of variations in the hydrostatic pressure of water with access to the bed. (Humphreys-ISWS) W75-03666

SUBGLACIAL GEOMORPHOLOGY SUR-ROUNDING THE ICE-FREE VALLEYS OF SOUTHERN VICTORIA LAND, ANTARCTICA, State Univ., of New York, Buffalo. Dept. of Geological Sciences. P. E. Calkin.

Journal of Glaciology, Vol 13, No 69, p 415-429, 1974. 7 fig, 47 ref. NSF GV-22761.

Descriptors: *Glaciers, *Geomorphology, *Remote sensing, *On-site investigations, *Antarctic, Glaciology, Evaluation, Ice, Topography, Shape, Surveys, Sounding, Depth. Identifiers: *Radio-echo, Subglacial topography, Wilson Piedmont Glacier, Mackay outlet glacier, Ferrar outlet glacier, Taylor outlet glacier, Victoria Land(Antarctia).

The results of airborne radio-echo (R/E) depth sounding over Wilson Piedmont Glacier, Mackay, Ferrar and Taylor outlet glaciers, and over the ice sheet bordering the mountains, provide ice thicknesses and subglacial topography accurate to 20 m and to 1 km areally. The R/E records show Valleys occur beneath the Wilson Piedmont at elevations of -260 m, and up to 260 and 670 m, respectively. The 670 m 'threshold' may have blocked easterly marine and glacial invasions experienced by lower valleys. Profiles along the out-let glaciers display large depressions, some below sea-level. These are associated with erosion by tributaries and with glacial erosion through thick dolerite sills. Elevated ridges thought to be sills submerged beneath the heads of these glaciers also limit nourishment from the adjacent part of the ice sheet. The subglacial west flank of the mountains is formed by a series of high steep-sided plateaux with gentle west-sloping surfaces. Block faulting, west-dipping dolerite and sandstone units, and glacial erosion must explain this topography. (Humphreys-ISWS) W75-03667

GROWTH OF ENGELMANN SPRUCE (PICEA ENGELMANNII) UNAFFECTED BY IN-CREASED SNOWPACK, Forest Service (USDA), Fort Collins, Colo. Rocky

Mountain Forest and Range Experiment Station. For primary bibliographic entry see Field 2I. W75-03844

2D. Evaporation and Transpiration

RELATIONSHIPS BETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT, Kansas State Univ., Manhattan. Dept. of Agrono-

For primary bibliographic entry see Field 3F. W75-03307

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE, RAND Corp., Santa Monica, Calif. For primary bibliographic entry see Field 2B. W75-03635

ACTUAL EVAPOTRANSPIRATION IN RELA-TION TO LEAF AREA, Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Hydrotechnical Lab.; and Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Climate Station. K. J. Kristensen.

Nordic Hydrology, Vol 5, No 3, p 173-182, 1974. 4 fig, 1 tab, 6 ref.

Descriptors: *Evapotranspiration, *Soil-water-plant relationships, Soils, Vegetation, Grasses, Water balance, Precipitation(Atmospheric), Leaves, Water utilization, Barley, Sugar beets. Identifiers: *Potential evapotranspiration, *Leafarea index.

The ratio of leaf area to ground area required for maintaining potential evaporation was studied in a 4-year investigation. The influence of leaf area index on the water use and the actual water balance was discussed. Soil water content under barley, sugar beets, short grass and long grass was followed regularly during the growing seasons of 1969-1973 with the neutron scattering method. Soil water content was determined for 20 cm soil layers through a 0-160 cm soil profile. Periodic actual evaporation was calculated from a simplified water balance equation. The potential evapotrans-piration was measured directly, and estimated ac-cording to Penman. Ratios of actual to potential evapotranspiration were shown as functions of the leaf area index, measured simultaneously with the soil water measurements. The leaf area index must exceed 3 in order to achieve potential evapotrans-piration from a crop. As the maximum actual evapotranspiration exceeds the measured potential one, but not significantly the calculated one, the latter was considered to be the most realistic in the growing season. The actual evapotranspiration from barley and sugar beets is constant from one water capacity soils under Danish conditions.

(Roberts-ISWS) W75-03653

POTENTIAL EVAPOTRANSPIRATION IN CENTRAL IRAQ USING THE PENMAN METHOD WITH MODIFIED WIND FUNCTION,

Baghdad Univ. (Iraq). Coll. of Agriculture. G. A. Al-Nakshabandi, and J. W. Kijne. Journal of Hydrology, Vol 23, No 3/4, p 319-328, 1974. 1 fig, 3 tab, 27 ref.

Descriptors: *Evapotranspiration, *Winds, Radiation, Pan evaporation, Equations, *Regression analysis, Wind velocity, Meteorology, Statistical

Identifiers: *Potential evapotranspiration, *Iraq, *Penman equation, Wind function.

Radiation was correlated with hours of bright sunshine for central Iraq. The resulting regression equation, which was in good agreement with other regressions derived for similar climatic regions, was used in Penman's combination equation. velocity and the aerodynamic component of pan evaporation were better correlated than wind velocity and pan evaporation divided by the vapor pressure deficit. The resulting wind functions for the standard U.S. Weather Bureau A-pan and the sunken Colorado pan were incorporated in modified Penman equations for use in central Iraq. Potential evapotranspiration calculated according to the modified equations was compared to potential evapotranspiration calculated from the stan-dard Penman equation and from equations with modified wind functions reported in the literature, as well as with experimental data on water use by crops in Iraq. The equation modified for use in Iraq by means of the wind function for the A-pan resulted in a maximum value of the potential evapotranspiration of about 15 mm/day in July and August, which is a reasonable value for tall crops. The relative importance of the aerodynamic term in the combination equation is stressed for arid conditions where advection may be important and the vapor pressure deficit is great. (Roberts-ISWS)

W75-03656

ESTIMATING SOIL WATER CONTENT ON NA-TIVE RANGELAND,

Department of Agriculture, Sidney, Mont. For primary bibliographic entry see Field 2G.

2E. Streamflow and Runoff

PREDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL,
Mississippi State Univ., State College. Dept. of
Agricultural and Biological Engineering. For primary bibliographic entry see Field 8B. W75-03320

MIXING AND TRANSPORT, (LITERATURE

Delaware Univ., Newark. Dept. of Civil Engineer-

For primary bibliographic entry see Field 5B. W75-03554

FITTING A THREE-PARAMETER LOG-NOR-MAL DISTRIBUTION BY LEAST SQUARES,

Environmental Protection Agency, Athens, Ga. Southeast Water Lab. W. M. Snyder, and J. R. Wallace. Nordic Hydrology, Vol 5, No 3, p 129-145, 1974. 11 fig. 13 ref.

Descriptors: *Probability, *Distribution patterns, *Histograms, *Hydrologic data, Analytical techniques, *Least squares method, Parametric hydrology, Statistical methods, Streamflow, Runoff. Mathematics.

Identifiers: *Log-normal distribution, *Functional transform, Tolerance limits.

A three-parameter log-normal distribution was derived as an exact functional transform of an embedded normal distribution. The parameters of this function were evaluated by fitting to histograms of natural hydrologic data. The practice of transfor-mation of data was made unnecessary and could be eliminated. Tolerance limits of extreme hydrologic events can be calculated as transforms of the exact tolerance limits of the embedded normal, permitting precise probabilistic statements on statistics as T-year floods or droughts. (Singh-ISWS)

CALCULATION OF TEMPERATURE VARIA-TIONS OF SMALL MOUNTAIN STREAMS, Vrije Universiteit, Amsterdam (Netherlands).

Dept. of Meteorology. H. F. Vugts.

Journal of Hydrology, Vol 23, No 3/4, p 267-278, 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Streams, *Temperature, Energy equation, Radiation, Heat flow, Mountains, *Water temperature, Measurement, Meteorology, *Energy budget.

Identifiers: Net radiation, Bowen ratio.

Temperatures of small mountain streams were accurately predicted by an energy balance method. The technique was tested by performing micrometeorological measurements along the Vigilbach (Rio di San Vigilio/Dolomites, northern Italy). The water temperature was measured at 8 points from the source down to a distance of 9 km. A simple energy budget equation and measurements of five meteorological parameters made it possible to pre-dict water temperature variations of a mountain stream with an accuracy of 10%. It appeared that during the day on unshaded stretches the net radia-tion and the transfer of heat by conduction and turbulence are the predominant energy sources, and that during the night the energy gain due to friction of the water with the bottom plays an important role in the energy budget. The minimum water temperature was reached at 6 a.m. and the maximum was observed near 2 p.m., an hour after the maximum air temperature and the maximum net radiation. The fast response of the water temperature to the meteorological elements was the result of the shallowness of the stream. The mean daily water temperature occurred at about 10 a.m., and the daily amplitude of the water temperature increased in a downstream direction. Various energy balance terms were discussed and some results were shown. (Roberts-ISWS)

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SERIES.

RIES, Pittsburgh Univ., Pa. Dept. of Civil Engineering. R. G. Quimpo, and M-S. Cheng. Journal of Hydrology, Vol 23, No 3/4, p 279-287, 1974. 5 fig, 2 tab, 4 ref. NSF Grant GK-20388.

Descriptors: "Time series analysis, "Seasonal, "Synthetic hydrology, "Statistical methods, Analytical techniques, Stochastic processes, Streamflow, Simulation analysis, Mathematics, Model studies, Least squares method.

Identifiers: "Harmonic analysis, Random component.

The attempt to preserve seasonal characteristics in the modeling of streamflow time series has given rise to a decomposition scheme wherein a random process is superimposed on another periodic process. The identification of the seasonal component is generally done by harmonic analysis. The residuals are fitted with models which preserve autocorrelation at non-zero lags. Strong empirical evidence indicates that the amplitude and phase of the periodic component vary a lot with variation in the random process. The nature of this variability was examined by using simulated time series whose structure was assumed known. The random component tends to distort estimates of the amplitude and phase so that a relatively long series is needed to estimate parameters (60 years of simulated monthly data to give coefficients of variation of 0.16 for the amplitude and 0.20 for the phase angle). The variation of the phase angle and amplitude is highly dependent on the ratio of the variance explained by the periodic component to the variance of the random component. (Singh-ISWS) W75-03658

2F. Groundwater

ESTIMATION OF GROUNDWATER ACCESSION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRONMENTAL TRITIUM.

Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.

For primary bibliographic entry see Field 2H. W75-03528

GROUND-WATER QUALITY STUDY, Colorado State Univ., Fort Collins. For primary bibliographic entry see Field 5B. W75-0354

GROUND-WATER QUALITY MODELING, New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology. For primary bibliographic entry see Field 5B. W75-03661 OPTIMAL IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS MEDIUM WITH QUADRATIC PROGRAMMING,

California Univ., Los Angeles. Dept. of Engineering Systems. W. W-G. Yeh.

49th Annual Fall Meeting of Society of Petroleum Engineers of AIME, October 6-9, 1974, Huston, Texas. Paper Number SPE 5021, 1974, (California Water Resources Center Project UCAL-WRC-W-290). 3 tab, 12 ref.

Descriptors: *Computer programs, *Algorithms, *Aquifers, *Optimization, Equations. Identifiers: *Quadratic programming.

A new algorithm is developed for parameter identification in a partial differential equation associated with an inhomogeneous aquifer system. The parameters chosen for identification are the storage coefficient, a constant and transmissivities, functions of the space variable. An implicit finite-difference scheme is used to approximate the solutions of the governing equation. A least-squares criterion is then established. Using distributed observations on the dependent variable within the system, parameters are directly identified by solving a sequence of quadratic programming problems such that the final solution converges to the original problem. The advantages of this new algorithm include rapid rate of convergence, ability to handle any inequality constraints and easy computer implementation. Numerical example presented demonstrates simultaneous identification of twelve (12) parameters in matter of seconds of computer time. (Snyder-California, Davis)

ON THE OPTIMAL IDENTIFICATION OF PARAMETERS IN A PARABOLIC SYSTEM, California Univ., Los Angeles. Dept. of Engineering Systems.
W. W-G, Yeh.

48th Annual Fall Meeting of American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., Sept 30-Oct 3, 1973, Las Vegas, Nevada. Paper Number SPE 4547, (California Water Resources Center Project UCAL-WRC-W-290). 2 fig. 2 tab. 8 ref.

Descriptors: *Systems analysis, *Porous media, *Unsteady flow, *Optimization, Equations, Linear programming. Lentifiers: *Ouasilinearization.

An analysis is presented of the problem of parameter identification in unsteady fluid flow through a porous medium. The response of the system is governed by a second order partial differential equation of parabolic type. Identification is an inverse process whereby the parameters imbedded in a differential equation is determined from observations of systems input and output along with appropriate initial and boundary conditions. These parameters are usually not physically measurable. In general, the governing equation is non-linear with no closed-form solution. This inverse problem is solved by quasilinearization, maximum principle, gradient method, influence coefficient method and linear programming. A comparison is made between these methods. The problem of convergence and stability is discussed and demonstrated by numerical experimentation. (Snyder-California,Davis)

2G. Water In Soils

RELATIONSHIPS BETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT,
Kansas State Univ., Manhattan. Dept. of Agrono-

my.

For primary bibliographic entry see Field 3F.

MOBILITY AND DEACTIVATION OF HERBI-CIDES IN SOIL-WATER SYSTEMS, Nebraska Univ., Lincoln. Water Resources Research Inst. For primary bibliographic entry see Field 5B.

W75-03314

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS, Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03422

CHARACTERIZATION OF ACTINIDE BEAR-ING SOILS: TOP SIXTY CENTIMETERS OF 216-Z-9 ENCLOSED TRENCH, Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03423

MOISTURE PROFILES IN SWELLING SOILS, Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.

Australian Journal of Soil Research, Vol 12, No 2, p 71-75, December 1974. 2 fig, 1 tab, 9 ref.

Descriptors: "Soil water movement, "Expansive clays, Soil physical properties, Expansive soils, Moisture content, On-site tests, Water table, Equilibrium, "Soil moisture, "Soil profiles. Identifiers: "Swelling soils.

Recent developments in the theory of hydrostatics and hydrodynamics of swelling soils have predicted that they will differ considerably from non-swelling soils in many aspects of their hydrologic behavior. Examples used to illustrate the results have been derived from arbitrary or laboratory data on soil properties. To test the results in the field, equilibrium moisture profiles in two claysoils and one loam soil with permanent shallow water tables are examined. In addition, moisture profiles in periods of approximately steady upward flow are examined for one of the clays are typical of the predicted 'hydric' profiles for swelling materials; and water moves upwards against the moisture gradient. The equilibrium profile for the loam is typical of those observed for non-swelling materials. (Levick-CSIRO)

DETERMINATION OF LIQUID CONDUCTIVI-TY OF CAPILLARY POROUS SOLIDS, Waterloo Univ. (Ontario).

Naturalian Chemical Engineering, Vol 15, No 9, p 19-23, September 1974. 3 fig, 2 tab, 3 ref.

Descriptors: *Hydraulic conductivity, *Porous media, *Measurement, Laboratory tests, *Capillary conductivity, Drying, Heat balance, Heat transfer.

An experimental technique is proposed, and results of tests reported, whereby conductivity is determined by a method based on the rate of drying of the solid within an isothermal constant rate period. This factor is direct and easy to measure, by contrast with the liquid content profile, which is required by other methods. The value of conductivity obtained represents the effective value for the entire drying process, and can be utilized to predict the performance of the same solid under non-isothermal conditions. (Levick-CSIRO) W75-03532

PRODUCTIVITY IN DWARF WHEATS IN A SILT-LOAM SOIL AS INFLUENCED BY SOIL-

Field 2-WATER CYCLE

Group 2G-Water In Soils

MOISTURE REGIMES AND NITROGEN FER-

TILIZATION UNDER SHALLOW WATER Govind Ballabh Pant Univ. of Agriculture and Technology, Pantnagar (India). Dept. of Agrono-

For primary bibliographic entry see Field 3F.

THE EFFECT OF SHELTER BELTS AND IR-RIGATION ON WATER USE IN A DRY RE-GION,

Norges Landbrukshoegskole, Vollebeck. Dept. of

Agricultural Hydrotechnics. For primary bibliographic entry see Field 3F. W75-03652

MOISTURE-VEGETATION-TEMPERA-TURE RELATIONSHIPS IN CENTRAL ALASKA, California Univ., Davis. Dept. of Water Science

J. N. Luthin, and G. L. Guymon. Journal of Hydrology, Vol 23, No 3/4, p 233-246, 1974. 4 fig. 1 tab, 19 ref.

Descriptors: *Soil moisture, *Alaska, *Vegetation, *Soil temperature, Temperature, Descriptors: Frozen soils, Pore pressure, Drainage, Hydrology, Model studies, On-site investigations. Identifiers: Thermistors, Internal drainage, Thermal regime, *Goldstream Valley(Alas).

Measurements of soil moisture and soil temperature were made during the summer of 1972 at four locations in the Goldstream valley near Fairbanks, Alaska. Two sites were under aspen-birch forest, one in stunted black spruce forest, and one in cleared grassland. These field results and observations of conditions in central Alaska led to the development of a model showing the interrelationship among drainage, vegetative cover, and the thermal regime of the mineral soil. In addition the subsystem comprising the thermal regime system have been identified. There were areas where the microclimate will cause permafrost to occur in the soil regardless of the vegetative cover and/or presence of peat layer. The remainder of the region normally did not have permafrost if vegeta-tive effects were removed. The vegetative canopy, the snow, and the surface organic layer may be lumped together as a single system, a buffer zone between the atmosphere and the mineral soil. Permafrost created a poorly drained environment that inhibited evapotranspiration. (Roberts-ISWS) W75-03657

AUTUMN, WINTER AND SPRING SOIL TEM-PERATURES IN OKSTINDAN, NORWAY, University Coll., Cardiff (Wales). Dept. of Geolo-

For primary bibliographic entry see Field 2C. W75-03665

AXISYMMETRIC INFILTRATION IN SOILS, II. SUMMARY OF INFILTRATION CHARAC-TERISTICS RELATED TO PROBLEM SPECIFI-CATIONS.

Utah Water Research Lab., Logan.

R. W. Jeppson. Journal of Hydrology, Vol 23, No 3/4, p 191-202, 1974. 9 fig, 2 ref, append.

Descriptors: *Infiltration, *Soil moisture, *Soil water movement, Pores, Soil properties, Percolation, Pore pressure, Saturation, Infiltrometers, Hydraulic properties, Boundary processes, Regression analysis, Numerical analysis, Hydrau-

lic gradient.

Identifiers: *One-dimensional flow, *Wetting front, Flux, Hydraulic head.

Part II compiles solutions obtained by the methods described in part I (See also W75-01990).

Techniques for numerical solutions were obtained in part I to the transient, three-dimensional axisymmetric, unsaturated moisture movement through homogeneous soil due to infiltration over a horizontal circular surface area. These relation-ships were applied to measurements in ring infiltrometers and similar problems of unsaturated ax-isymmetrical flow. The results illustrated how greater understanding of the infiltration process can result by contracting a series of solutions obtained by varying a single problem solution. (Visocky-ISWS) W75-03670

EFFECTS OF EXPERIMENTAL SOIL MOISTURE FLUCTUATIONS ON TURNOVER RATES OF TESTACEA, Calgary Univ. (Alberta). Dept. of Biology.

Soil Biol Biochem, Vol 6, No 1, p 19-26, 1974.
Identifiers: Aspen, *Soil moisture, *Testacea,
Turnover rates, *Canada(Rocky Mountain region).

Experiments designed to obtain data on the quantitative effects of an artificial increase in soil moisture content during a seasonal dry period on numbers of soil Testacea were carried out in welldrained aspen woodland soil in the Rocky Mountains of Canada. The general effect of the addition of water to the soil was to increase significantly the number of active Testacea and decrease the number of encysted forms. Numbers of active Testacea and of living Testacea (active plus encysted forms) showed significant, positive correlation with soil moisture content. A method for the estimation of standing crop turnover and secondary production is discussed. Generation times were shorter and secondary production higher in the watered plots.--Copyright 1974, Biological Ab-W75-03681

ESTIMATING SOIL WATER CONTENT ON NA-TIVE RANGELAND,

Department of Agriculture, Sidney, Mont. J. K. Aase, J. R. Wight, and F. H. Siddoway.

Agric Meteorol, 12(2): 185-191, 1973. Identifiers: Evaporation, *Mathematical models, Model studies, *Penman method, Rangeland, *Soil water, *Evapotranspiration, Estimating, *Range management

A model for estimating soil water content on na-tive rangeland was tested at Sidney, Montana. Based on the Penman combination method for estimating potential ET (evapotranspiration) the model includes factors to account for crop development, limiting soil water content, and increased evaporation after rain. The model gave reasonable estimates of actual soil water conditions within a 15% limit suggested as being practical for rangeland management purposes.--Copyright 1974. Biological Abstracts. Inc. W75-03800

PREDICTION OF SUBTROPICAL STORM SOIL LOSSES FROM FIELD PLOT STUDIES.

Rhodesia Univ., Salisbury. Dept. of Geography. M. A. Stocking, and H. A. Elwell.
Agric Meteorol, Vol 12, No 2, p 193-201, 1973.
Identifiers: Infiltration, *Prediction, Runoff, *Soil losses, *Vegetation cover, *Corn(Field), *Tropical

Daily soil losses were recorded from experimental field plots planted to maize on 2 different but con mon soil types. Planting densities were 12,350-37,000 plants/ha and slopes, 3-8%. One bare fallow plot was included in the investigation. The results show the significance of derived energy-intensity parameters in predicting soil losses: EI30 (total kinetic energy x maximum sustained energy over 30 min) on bare soil; EI15 on all covered plots to nearly maximum vegetal cover; and EI5 on high density late season crops. Different slopes appear

to have no relevance as to choice of parameter. Cover combined with varied infiltration and runoff conditions are suggested as the main determinants for choice of storm soil loss parameters.—Copyright 1974, Biological Abstracts, Inc.

EVALUATING WELL CONSTRUCTION, (PART

Agricultural Research Service, Beltsville, Md. For primary bibliographic entry see Field 5B. W75-03813

EFFECT OF ORGANIC MULCHES ON THE HYDROTHERMAL REGIME OF SOIL AND GROWTH OF POTATO CROP IN NORTHERN

Punjab Agricultural Univ., Ludhiana (India). For primary bibliographic entry see Field 3F. W75-03837

2H. Lakes

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR SIG-NIFICANCE TO OLIGOTROPHIC LAKES, De Paul Univ., Chicago, Ill. Dept. of Chemistry. For primary bibliographic entry see Field 5B. W75-03304

EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SAL-MONELLA CARRIERS AND THEIR ENVIRON-MENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN), Institut fuer Medizinisches Mikrobiologie Kantons

Sankt Gallen (Switzerland).
For primary bibliographic entry see Field 5C.
W75-03330

CHEMISTRY OF SOME WATERS: LAKE PEDDER, SOUTH-WEST TASMANIA,
Tasmania Univ., Hobart (Australia). Dept. of

For primary bibliographic entry see Field 5B. W75-03390

ESTIMATION OF GROUNDWATER ACCES-SION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRON-

MENTAL TRITIUM, Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils. G. B. Allison.

Australian Journal of Soil Research, Vol 12, No 2, p 119-131, December 1974. 6 fig, 3 tab, 15 ref.

Descriptors: *Lakes, *Groundwater movement, *Evaporation, *Water balance, *Tritium, Radioisotopes, Energy budget, Estimating, Advection, *Australia. Little Blue Lake(SA), Gambi Identifiers: Plain(SA)

In an investigation of the water balance of a small lake which penetrates a limestone aquifer in South Australia, a combination of tritium balance and evaporation estimates was used. Calculation of an approximate tritium balance using semi-empirical methods of estimating evaporation gave an ap-proximate value for groundwater inflow, which was used to estimate the advected term in the lake's energy budget, and hence revise the initial estimate for evaporation. The revised estimate al-lowed a refinement of the tritium balance which in turn gave a more precise estimate of groundwater inflow. The estimate of groundwater flow is in good agreement with a value computed using groundwater isopotentials and lake and groundwater chemistry. Groundwater throughflow in the lake, which has a volume of 96,000 cubic meters, is estimated to be about 30,000 cubic meters annually. (Levick-CSIRO)

TOLYTIC BACTERIA IN AN EUTROPHIC LAKE, (IN GERMAN),
Freiburg Univ (West)

Freiburg Univ. (West Germany). Limnologisches Institut

For primary bibliographic entry see Field 5C.

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS III. SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVI-ANITE, (IN GERMAN), Freiburg Univ. (West Germany). Limnoloaisches

For primary bibliographic entry see Field 5B. W75-03571

THE BIOLOGY OF A LANDLOCKED FORM OF THE NORMALLY CATADROMOUS SAL-MONIFORM FISH GALAXIAS MACULATURE (JONYNS): V. COMPOSITION OF THE DIET, New South Wales State Fisheries, Sydney (Australia)

D. A. Pollard.

Aust J Mar Freshwater Res Vol 24, No 3, p 281-295, 1973.

Identifiers: Amphipods, *Australia(Lake Modewarre), Biology, Catadromous, Chironomids, Cladocers, Copepods, Crustacean, *Australia(Lake Catadromous, *Diet(Fish), *Galaxias-maculatus, Growth, Insects, Lakes, Larvae, Ostracod, Salmoniform, Seasons, Trichoptera, Victoria, Zygoptera.

The composition of the diet of a landlocked form of the normally catadromous stream-dwelling fish G. maculatus from Lake Modewarre in southwestern Victoria (Australia) was studied using a new method of stomach contents analysis based on the principle of ranking. The overall diet of this landlocked fish was found to consist mainly of amlandlocked fish was found to consist mainly of amphipods, chironomid larvae and copepods (basic food types), with other groups of crustaceans (Cladocerans and ostracods) and insects (trichopteran and zygopteran larvae) being of lesser importance (secondary food types) and a few other incidential food types occurring in only small amounts. The diet of this landlocked form thus consists mainly of crustaceans, in contrast to that of the stream-dwelling form which comprises mainly insects. There was a change in the pattern of feeding in the landlocked fish with growth, the smaller fish eating more of the smaller planktonic and the larger fish more of the larger littoral-benthic food organisms. Amphipods were the dominant food type during all seasons except au-tumn, when copepods were dominant. Cladocerans were also important when they bloomed in summer, and chironomid adults when they swarmed in autumn. Selection coefficients indicated that those food types which were domi-nant in the diet were actively selected and those that were unimportant were avoided. This landlocked galaziid was found to share most of the available food resources with the other 4 fish species found in the lake and can be broadly classified as a euryphagic carnivore. (See also W73-02855 and W75-02856).--Copyright 1974, Biological Abstracts, Inc. W75-03597

OBSERVATIONS ON THE ECOLOGY OF LACRUSTRINE POPULATIONS OF THE THREESPINE STICKLEBACK (GASTEROSTEUS ACULEATUS L., 1758) IN THE MATAMEK RIVER SYSTEM, QUEBEC, Ottawa Univ. (Ontario). Dept. of Biology.

For primary bibliographic entry see Field 5C. W75-03625

AN OUTLINE OF THE PHYSICAL LIMNOLOGY OF LAKE MALAWI (LAKE NYASA). Ministry of Agriculture and Natural Resource Monkey Bay (Malawi). Fisheries Research Unit. D. H. Eccles.

Limnology and Oceanography, Vol 19, No 5, p 730-742, September 1974. 9 fig, 1 tab, 14 ref.

Descriptors: *Limnology, *Lakes, *Data collections, Physical properties, Thermocline, Water temperature, Stratification, Geomorphology, Currents(Water), Climatic Hydrologic data, On-site data collections, Evaluation, Africa Identifiers: *Malawi(Lake Malawi).

Lake Malawi, in tropical central Africa, is 560 by 75 km and consists of a single basin, maximum depth 695 m. Below 250 m the lake is homothermal at about 22.5C and is anoxic. Above this level there is a seasonal cycle with the development of a marked thermocline. By May the upper 60 m is homothermal at about 27C. During the dry, windy, cool season the epilimnion cools, but only in exceptional years approaches a homothermal condition. Complete mixing has never been observed. In the shallower southeast arm the surface temperature may fall to 21C as the result of inshore chilling; this cool water flows northward as a profile-bound density current and appears to maintain the stability of the stratification. Large-scale oscillations of the level of the thermocline, apparently the result of internal waves and of windinduced upwelling, cause advections of water from the metalimnion into the southeast arm, site of the major fishery in the lake. (Humphreys-ISWS) W75-03660

RANGE OF CUMULATIVE SUMS, II. APPLICATION TO STORAGE CAPACITY OF RESER-

VOIRS, Colorado State Univ., Fort Collins.

J. D. Salas-La Cruz. Journal of Hydrology, Vol 23, No 3/4, p 329-339, 1974. 9 fig, 1 tab, 5 ref. NSF Grant GK-31512X.

Descriptors: *Storage capacity, *Reservoirs, *Seasonal, *Mathematical models, Inflow, Statistical methods, Markov processes, Stream flow, Stochastic processes, Hydrology, Analytical techniques, Computers, Water level fluctuations. Identifiers: *Range of cumulative sums, Periodic

An attempt was made to determine the storage capacity of a reservoir when within-the-year water fluctuations are taken into account. A sensitivity analysis was carried out to determine the chara teristics of the expected range for various types of input series and the long-term effect of the phases the periodic components. Subsequen mathematical model was proposed for the ex-pected storage as composed of a deterministic part and a stochastic part. An example of the application of the proposed model was included. (Singh-ISWS) W75-03669

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,
For primary bibliographic entry see Field 5C. W75-03686

ALGAL NUTRIENT LIMITATION IN LAKE ONTARIO AND TRIBUTARY WATERS, Wisconsin Univ., Madison. Dept. of Civil En-For primary bibliographic entry see Field 5C. W75-03757

PRIMARY PRODUCTION IN RELATION TO TEMPERATURE STRUCTURE, BIOMASS CON-CENTRATION, AND LIGHT CONDITIONS AN INSHORE AND OFFSHORE STATION IN LAKE ONTARIO. Canada Centre for Inland Waters, Burlington

(Ontario).

For primary bibliographic entry see Field 5C. W75-03764

NUTRIENT UPTAKE KINETICS IN PHYTOPLANKTON: A BASIS FOR NICHE SEPARATION, State Univ. of New York, Albany. Dept. of

Biological Sciences. For primary bibliographic entry see Field 5C. W75-03766

NITROGEN AND PHOSPHORUS AVAILABILITY IN LAKE ONTARIO TRIBUTARY WATERS DURING IFYGL.

Texas Univ., Dallas. Inst. for Environmental Sciences.

For primary bibliographic entry see Field 5C. W75-03768

LIMNOLOGICAL STUDIES RECENT OKANAGAN BASIN LAKES AND THEIR CONTRIBUTION TO COMPREHENSIVE WATER RESOURCE PLANNING,

Fisheries Research Board of Canada, West Vancouver (British Columbia). Pacific Environment

J. G. Stockner, and T. G. Northcote. Journal Fisheries Research Board of Canada, Vol 31, No 5, p 955-976, 1974. 9 fig, 11 tab, 28 ref.

Descriptors: *Limnology, *Lakes, *Water resources, *Comprehensive planning, *Canada, Management, Geomorphology, Thermal properties, Economic impact, Currents(Water), Alternative planning, Ions, Nutrients, Phosphorus, Chemical properties, Mercury, Nitrogen, Phytoplankton, Rooted aquatic Plants, Periphyton, Water pollution sources, Zooplankton, Benthos, Paleolimnology, Fisheries, Bioassay, Water quality, Trophic level.

Identifiers: *Okanagan Basin(British Columbia).

The contribution of limnology in comprehensive planning for water resources management served four basic functions in the study of the Okanagan Basin, British Columbia Lakes by providing an as-sessment of current conditions, predicting lakes' response to future waste loadings, estimating lake assimilative capacity, and in developing a monitor-ing program to assess lake response to implementation of waste management plans. The manner and sequence in which these functions were allied and sequence in which these functions were affect to the development of overall planning strategies is diagrammatically illustrated. Essentially all lim-nological studies were necessary to an understanding of current conditions although fewer con-tributed to the determination of lake nutrient assimilative capacity. Only five studies served to guide future lake monitoring. The effectiveness of a particular study is determined on the number of functions it fulfills. Five studies were major contributors: Paleolimology, chemical and physical limnology, bioassay, and periphyton. The remain-ing investigations contributed more to specific programs than to general functions. Paring down programs than to general functions. Paring down expansive programs to 'bare bones' limnology has proved to be a valuable feature of the initial planning procedure and should be encouraged in future studies of this type. The role of limnologists in this type of study is discussed and encouraged. (Auen-Wisconsin) W75-03769

PHYTOPLANKTON WHICH ARE POLLUTION INDICATORS IN LAKES, (IN SWEDISH), Vandkvalitetsinstitut, Soborg (Denmark). For primary bibliographic entry see Field 5B.

Field 2-WATER CYCLE

Group 21 - Water In Plants

2I. Water In Plants

PRESSURE FRACTIONATION CHARACTERISTICS OF WATER HYACINTH, Florida Univ., Gainesville. Dept. of Agricultural Engineering. For primary bibliographic entry see Field 4A. W75-03302

SPECIFIC PRODUCTION OF AQUATIC INVER-

For primary bibliographic entry see Field 5C. W75-03327

THE NATURE OF WATER POTENTIAL GRADIENTS IN TREES, (IN GERMAN), Hochschule fuer Bodenkultur, Vienna (Austria).

Botanisches Institut.

H. Richter. Ber Dtsch Bot Ges, Vol 85, No 7/9, p 341-351,

1972. English summary.
Identifiers: Cohesion, Gradients, *Suction tensions, *Trees, *Water potential gradients, *Distribution patterns.

The distribution of water potentials (or, in a closely corresponding terminology, suction tensions) in trees is frequently discussed without an adequate consideration of both experimental and theoretical aspects of the problem. The relative importance of hydrostatic tensions thus generally becomes vastly overestimated (Plumb and Bridgman 1972). Results from work with the pressure bomb technique suggest frictional gradients as a by far more important factor for the total tension difference between 2 points in the plant. A true gradient of potential or pressure is established only along a coherent conduit in the xylem, however not between the twigs at the end of different branches. It can be shown that, under certain environmental conditions, tension differences between these end twigs may become negligible. This fact cannot serve as an argument against the validity of the cohesion concept as suggested by Tobiessen et al. 1971; rather it is a necessary consequence of the suction tension equation and the well-known minimal differences of potential osmotic pressures in a tree.--Copyright 1974, Biological Abstracts, Inc. W75-03336

LIGHT AND WATER SUPPLY AS FACTORS IN-FLUENCING THE DEGREE OF STOMATAL OPENING IN CONIFERS, (IN GERMAN), Hochschule fuer Bodenkultur, Vienna (Austria).

Botanisches Institut.

W. Rottenburg, and T. Koeppner.

Ber Dtsch Bot Ges, Vol 85, No 7/9, p 353-362,

1972. English summary. 1972. English summary. Identifiers: Abies-alba, *Confers, Flow, *Light, Porometer, *Stomatal openings, Taxus-baccata, Viscous, *Water supply.

Dependence of stomatal reactions on light and water supply was investigated on Abies alba and Taxus baccata under controlled environmental conditions. A viscous flow porometer specially developed for determination of the opening degree of coniferstomata was used. The maximum sto-matal opening of Abies and Taxus is given as a result of an illumination time of approximately 40-50 min. The stomata of Abies show an earlier and more sensitive reaction than Taxus on water deficit caused by transpiration. In principle, the stomata of Abies and Taxus show a similar reaction to darkening, Taxus however closes faster. Each species reaches a maximum of stomatal opening according to the light intensity. These maxima are at very different light intensities. An increase of leaf-temperature must not be held responsible for the decrease of the stomatal opening ing with increasing light intensity. On the contrary, the increasing water deficit seems to cause the closure of the stomata. The more the water deficit increases the more the stomata are closed. Taxus reacts significantly more sensitively than Abies. If a needle is detached and measurements of the stomatal opening are done in short intervals (30s), no change shows up during the 1st 2 min. Afterwards a short opening reaction can be observed owing to the loss of turgor of the cells adjacent to the guard cells. Then the degree of stomatal opening decreases constantly owing to the loss of water. Again the stomata of Taxus are closed signifi-cantly faster than the stomata of Abies.--Copyright 1974, Biological Abstracts, Inc.

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ECOLOGICAL STUDIES.

Atomic Energy Commission, Washington, D.C. For primary bibliographic entry see Field 5C.

FLORA OF THE ENTERPRISE RADIATION

Nicolet Coll.-Technical Inst., Rhinelander, Wis. For primary bibliographic entry see Field 5C. W75-03406

DESCRIPTION AND CLASSIFICATION OF PLANT COMMUNITIES IN SITE 1 AND THE CONTROL AREA,

Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C. W75-03407

PHYSICAL CONDITION AND DIMENSIONS OF TREES IN SITE 1 AND THE CONTROL AREA Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5C.
W75-03408

PROPERTIES OF THE TREE FLORA IN THE FOREST TRANSITION FROM ASPEN TO MAPLE-BIRCH TYPE, Michigan State Univ., East Lansing

For primary bibliographic entry see Field 5C.

TEMPORAL AND SPATIAL PATTERNS OF PRETREATMENT LITTER PRODUCTION IN SITE 1 AND THE CONTROL AREA, Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station. For primary bibliographic entry see Field 5C. W75-03411

LEAF-LITTER PRODUCTION IN THE ASPEN AND MAPLE-BIRCH FOREST TYPES AND THE CONTRIBUTION BY INDIVIDUAL TREE SPE-

Michigan State Univ., East Lansing. For primary bibliographic entry see Field 5C. W75-03412

EFFECTS OF THINNING ON NEEDLE WATER

POTENTIAL IN RED PINE,
Minnesota Univ., Saint Paul. Coll. of Forestry.
E. Sucoff, and S. G. Hong.
For Sci, Vol 20, No 1, p 25-29, 1974, Illus.
Identifiers: *Needle water potential, *Pine trees(Red),
*Pinus-resinosa, Soil moisture, *Thinning(Trees).

Soil moisture (SM) and needle water potential (Psi sub n) were measured the season following thinning on comparable trees (Pinus resinosa) in thinned and unthinned plots. SM availability was described by plotting Psi sub n at dawn against SM content. SM was always higher in the thinned plot

but Psi sub n was significantly higher in the thinned plot on only 4 of 10 measurement days. On these 4 days, SM was more available to the thinned trees. Significant differences in Psi sub n occurred on 20% of the days during the 1969 growing season.--Copyright 1974, Biological Abstracts,

W75-03499

HYDRATION OF EASTERN HEMLOCK AS IN-

HYDRATION OF EASTERN HEMLOCK AS IN-FLUENCED BY WAXING AND WEATHER, Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology and Climatology. N. C. Turner, and H. C. De Roo. For Sci, Vol 20, No 1, p 19-24, 1974, Illus. Identifiers: Air, Extracellular, Film, Freezing, *Hemlock, *Hydration, Stem diameter, Tempera-ture, Transpirant, Tsuga-canadensis, Wax, *Waxing, *Weather, *Xylem pressure potential, Trees.

The xylem pressure potential and stem diameter of small, container-grown, eastern hemlock (Tsuga canadensis (L.) Carr.) trees placed in an open field were measured several times during 6 Jan. and 1 May 1972. Some trees were sprayed with 1 or 2 coats of either 20% (v/v(volume in volume)) or 40% Mobileaf, a wax-film antitransparant. The wax provided no significant thermal insulation for the needles. On days when the air temperature was above 0C, the xylem pressure potential was lower in unwaxed trees than in waxed trees and in unwaxed trees than in waxed trees and decreased with increasing vapor pressure deficit of the air in the unwaxed but not in the waxed trees. Those treated with 40% Mobileaf had only slightly higher potentials than those treated with 20% Mobileaf, and trees with a 2nd film of wax maintained only slightly higher potentials than those with a single film. On days when air temperatures were below 0C, the potentials of the waxed and unwaxed foliage were very similar but differed after warming for 1 hr at 19C. Warming the foliage initially increased the potentials in all treatments. At temperatures below 0C the trees treatments. At temperatures below 0C the trees had lower potentials at equivalent vapor pressure deficits than those sampled at above OC. Tempera-tures below OC also significantly reduced the diameter of the stems in both waxed and unwaxed hemlocks. Apparently, low potentials and stem shrinkage at temperatures below 0C arise from extra-cellular freezing which antitranspirants affect little, but antitranspirants can reduce dehydration markedly on warm spring days.—Copyright 1974, Biological Abstracts, Inc. W75-03500

THE SPHAGNUM FLORA OF HOT SPRINGS IN

Copenhagen Univ. (Denmark). Inst. of Systematic Botany.

B. Lange.
Lindbergia, Vol 2, No 1/2, p 81-93, 1973.
Identifiers: Flora, *Iceland(Hot S. Flora, *Iceland(Ho Sphagnum-palustre, Sphagnum-subnitens, Sphagnum-Sphagnum-*Sphagnum, papillosum, teres, Springs, Temperature, Aquatic plants, Hydrogen ion concentration.

The Sphagnum flora of the hot springs in Iceland is mostly associated with alkaline waters and is often much more richly developed there than in other parts of Iceland. Dominant species are S. teres, S. papillosum, S. subnitens and S. palustre. Of these, only S. teres is dominant in the Sphagnum flora of Iceland as a whole, while S. palustre is exclusive to the springs. Several species associated with the springs can be considered members of an oceanic element. The flora of the individual springs varies, probably due to differences in chemical composition of the water but, overall, the spring flora differs radically from that elsewhere in Iceland. The most characteristic species are also those which grow closest to the very hot water. Water tempera-tures of up to 42C have been measured in Sphagnum tussocks.--Copyright 1974, Biological stracts, Inc. W75-03526

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTA-TIVE BASIN

Swedish Meteorological and Hydrological Inst.,

B. Bringfelt, and P-O. Harsmar.

Nordic Hydrology, Vol 5, No 3, p 146-165, 1974. 7 fig, 7 tab, 5 ref.

Descriptors: *Rainfall disposition, *Forests, Canopy, Precipitation gages, *Interception, Rain-fall, Throguhfall, Evaporation, Hydrology, Watersheds(Basins), Rain gages, On-site data collections, Storage capacity. Identifiers: *Sweden.

During the summer and autumn of 1973, 25 rain troughs were operating below canopy and 4 in clearings of a predominantly coniferous forest in the Velen hydrological research area in southern Sweden. The troughs gave values of rainfall and throughfall. Stemflow was found to be below 5%, therefore, the difference was the rain intercepted on the canopy. The collected rain water amounts were measured 14 times, about once a week. These data and the records from a tipping-bucket rain gage were used in a simple model for throughfall. The overall water storage capacity of the forest canopy was about 2 mm and the free throughfall coefficient p was about 0.5. Observa-tion of 50 photographs taken upward from the troughs indicated a smaller p-value. The time for evaporation of the intercepted water after an average rain storm was roughly estimated as 5 About 26% of the total rainfall was intercepted and evaporated. Errors due to differences between types of gages were eliminated by using only values from troughs for both rainfall and throughfall. (Roberts-ISWS)

EFFECTS OF EXPERIMENTAL SOIL MOISTURE FLUCTUATIONS ON TURNOVER

MULSIUKE FLUCTUATIONS ON TURNO RATES OF TESTACEA, Calgary Univ. (Alberta). Dept. of Biology. For primary bibliographic entry see Field 2G. W75-03681

SNAIL POPULATION IN RUNNING WATER, Universidade Federal de Pernambuco, Recife (Brazil). Instituto de Biociencias. A. B. Coutinho, and F. A. B. Coutinho. Bull Math Biol, Vol 35, No 4, p 449-458, Illus,

Descriptors: *Running waters, Streams, Rivers, *Snails, Shellfish, Aquatic animals, *Animal populations, Channels, Animal control, Ecology, Model studies, *Ecosystems.

Identifiers: Biomphalaria-glabrata.

A model developed in a previous paper is used to study populations of Biomphalaria glabrata in fastflowing rivers and channels. The results are in good qualitative agreement with the phenomena experimentally observed and suggest that the use of artificial channels can be a very useful tool for the experimental study of some important aspects of the ecology of the B. glabrata.--Copyright 1974, Biological Abstracts, Inc. W75-03803

OBSERVATIONS ON THE NUTRITION OF LARVAE OF CHIRONOMUS F.L. PLUMOSUS IN THE WATERS OF THE DANUBE FLOOD AREA, (IN ROMANIAN),

G. Ignat, and L. Gruia. Stud Cercet Biol Ser Zool Vol 25, No 2, p 137-149,

1973. English summary.
Identifiers: *Algae, *Chiron
Flood areas, Larvae, *Chironomus-plumosus, Romania(Danube River), Swamps.

Data on the feeding place of larval of C. plumosus is presented by comparing algae from the intestine

of larvae with algae existing in the mud of the Crapina and Comorofca swamps (Romania). The intensity of diurnal feeding, the capacity of food (algae) selecting and digestion degree were analyzed in larvae.--Copyright 1974, Biological Abstracts, Inc. W75-03827

EFFECT OF WATER ON BACTERIAL MUL-TIPLICATION IN PLANT TISSUE, Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div. For primary bibliographic entry see Field 5C. W75.0331

W75-03831

POPULATION DYNAMICS OF HOPLOLAIMUS SP. AT VARIOUS LEVELS OF MOISTURE.

Pakistan Council of Scientific and Industrial Research, Karachi. For primary bibliographic entry see Field 5C.

MICROCLIMATE AND THERMAL STRESS OF MAN IN AN ALEPPO PINE PLANTATION AND AN OAK SCRUB, Volcani Inst. of Agricultural Research, Ilanot

(Israel). Forestry Div. G. Schiller, and R. Karschon.

Isr J Agric Res 23(2): 79-90, Illus. 1973.

Descriptors: *Recreation, Camp sites, *Forest management, Forests, *Microclimatology, Climates, *Pine trees, *Oak trees, *Environmental Identifiers: Aleppo pine, *Israel(Judean Hills).

Microclimatic measurements in an Aleppo pine plantation and in an open scrub in the Judean Hills showed a distinct improvement of the microclimate by the pine forest over that outside the plantation: lowering of air temperature, black-body temperature, global radiation, wind velocity and evaporation, and rise of relative humidity. Estimated values of thermal stress of man expressing the combined effects of environmental conditions and metabolic rate, were generally lower both within the Aleppo pine plantation and near its edge, than in the oak scrub. The implications of the findings for recreation and forest management are discussed .-- Copyright 1974, Biological Abstracts. Inc.

CHANGES IN STEM DIAMETER OF HER-BACEOUS AND WOODY PLANTS AS A MEA-SURE OF INTERNAL WATER BALANCE, Pahlavi Univ., Shiraz (India). Coll. of Agriculture. N. Sionit, and D. W. Henderson.

Iran J Agric Res 2(1): 39-50, 1973.

Descriptors: Climates, *Dendrometers, Electronic equipment, *Herbaceous plants, Irrigation, Light, Ligustrum-vulgare, Nicotiana-tabacum, Soils, Solanum-Tuberosum, *Stem diameter, Transpiration, *Woody plants, *Water balance.

A highly sensitive electronic dendrometer was used for studying the water relations and factors affecting the internal water balance of herbaceous plants. A potato (Solanum tuberosum L.) and a tobacco plant, (Nicotiana tabacum L.) with nonwoody stem structure, as well as a privet tree (Ligustrum vulgare L.), with woody-stem struc-ture, showed the following changes in stem diameter: rapid changes in response to light, diurnal variations due to climatic conditions and long term changes due to soil conditions Shrinkage in stem diameter was observed as soon as lights were turned on. This shrinkage was faster in the after-noon, when other climatic conditions were suitable for high transpiration. A rapid increase in stem diameter and transpiration rate was observed in both herbaceous and woody-stem plants immediately after irrigation. As soil water was depleted the rate of increase in stem diameter and transpiration declined. At low soil water content the stem started to shrink. These variations in stem diameter, due to changes in climatic and soil water conditions, were good indicators of the internal water balance for both herbaceous and woody-stem plants.--Copyright 1974, Biological Abstracts, Inc. W75-03840

EFFECT OF WATER STRESS UPON ENDOGENOUS ETHYLENE LEVELS IN VICIA

FABA, Ain Shams Univ., Cairo (Egypt). Dept. of Horticulture

A. S. El-Beltagy, and M. A. Hall. New Phytol, Vol 73, No 1, p 47-60, 1974.

Identifiers: Abscission, "Ethylene(Endogenous), Flower Growth rates, Leaf abscission, Synthesis, *Vicia-faba, *Water stress.

Conditions of drought or waterlogging lead to greatly increased internal ethylene concentrations in Vicia faba L. These increases appear to be due partly to decreased diffusion and partly to increased synthesis and are superimposed on normal diurnal fluctuations in internal ethylene concentration. The higher concentrations observed are correlated with a reduction in growth rate and in-creased leaf and flower absission and senescence. The role of ethylene in the mediation of developmental responses to water stress is discussed. Copyright 1974, Biological Abstracts, Inc. W75-03841

GROWTH OF ENGELMANN SPRUCE (PICEA ENGELMANNII) UNAFFECTED BY IN-CREASED SNOWPACK,

Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.

Arctic and Alpine Research, Vol 6, No 1, p 29-36, 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Dendrochronology, *Growth rates, *Snowpacks, *Snowmelt, *Mountain forests, *Cold regions, Coniferous forests, Forestry, Forest soil, Hydrologic cycle, Rime ice, Snowmelt water, Snow cover, Soil water, Soil-water plant relationships, Water yield improvement, Weather modification, Winds, *New Mexico.

Identifiers: Rio Grande, Blowing snow, Snow-

drifts, Tree breakage.

Annual radial growth of spruce in a forest interior where a natural snowpack is 1 to 1.5 m deep was only a little greater than near the border of an old burn where a large snowdrift ranges from 3 to 4.5 m deep. Growth was studied in the Sangre de Cristo Mountains, northeast of Santa Fe, New Mexico. The shallow snow cover melts during May and early June, while the deep snowdrift persists until late July or early August. Tree diameters averaged 24 to 30 cm and basal areas averaged 49 and 58 sq m ha to the minus one for deep and shallow snow sites, respectively. The results provide a good basis for speculating that weather modifica-tion programs to increase snowfall in the Southwest will have little detrimental effect on the annual or long-term radial growth of the existing W75-03844

LUCERNE IN WET SOILS: THE EFFECT OF STAGE OF REGROWTH, CULTIVAR, AIR TEMPERATURE AND ROOT TEMPERATURE, Department of Primary Industries, Brisbane

D. G. Cameron. Aust J Agric Res, Vol 24, No 6, p 851-861, 1973. Identifiers: *Air temperature, Cultivars, Damage, Flooding, Growth, *Lucerne, Medicago-sativa, *Root temperature, Soils, Temperature.

Field 2-WATER CYCLE

Group 21-Water In Plants

'Hunter River' lucerne (Medicago sativa L.) grown in pots, was subjected to either 21C or 33C connt temperatures for the 1st 10 days of regrowth. At 33C, flooding immediately after cutting killed 85% of the plants. Flooding 5 days after cutting 55% of the plants. Flooring 5 days after cutting killed 35% of the plants. Even when plants were not killed by flooding at 33C they were severely checked, and made negligible regrowth during the next 30 days. At 21C no plants were killed by flooding. Plants flooded immediately after cutting were severely checked but those flooded 5 days after cutting were similar to the unflooded controls 'Hunter River' lucerne flooded under all combinations of 20C and 30C air and root temperatures for the 1st 5 days after cutting was more severely affected at both root temperatures than Rhizoma and Lahontan lucernes. High root temperature during flooding had a severe effect on all cultivars, but high air temperatures did not affect flooding reaction. Possible mechanisms by which flooding occurs are discussed.-Copyright 1974, Biological Abstracts, Inc. W75-03847

DEFOLIATION, LEAF AREA INDEX, AND THE WATER USE OF FOUR TEMPERATE PASTURE SPECIES UNDER IRRIGATED AND DRYLAND CONDITIONS, University of New England, Armidale (Australia).

Dept. of Agronomy. For primary bibliogr ry bibliographic entry see Field 3F. W75-03848

SNOW-VEGETATION RELATIONSHIPS THE FOREST TUNDRA OF NOUVEAU-QUEBEC, HUDSON BAY, (IN FRENCH), Laval Univ., Quebec. Centre d'Etudes Nordiques. S. Payette, L. Filion, and J. Ouzilleau.

Nat Can (Que), Vol 100, No 5, p 493-508, 1973,

English summary.

Identifiers: Bays, *Canada(Hudson Bay), Cryptograms, *Forest tundra, Herbs, Krummholz sub-zone, New Quebec, *Soil-water-plant relation-ships, Snow, Soils, Tundra, Vegtation.

During the winter 1973, a snow study was undertaken at Poste-de-la-Baleine and Richmond Gulf, Nouveau-Quebec (Canada). There exists a strong relationship between snow cover properties and vegetation in the forest-tundra. Within defined topographic units, low vegetational structures, such as herbaceous and cryptogamic formations, have denser and more variable depth of snow cover than high vegetational structures, such as shrub and tree formations. These differences depend on the process of snow saturation in the en-vironment; this process is influenced by the nature and the spatial pattern of structural types of vegetation. Pattern of snow distribution is similar to pattern of major structural elements of the -arctic landscape. Soil conditions at Poste-de la-Baleine and in the forest subzone at Richmond Gulf seem more restrictive than snow conditions for regional expansion of forest formations. But snow influence is more pronounced in the krumm-holz subzone of Richmond Gulf.--Copyright 1974, Biological Abstracts, Inc. W75-03849

2J. Erosion and Sedimentation

SEDIMENT IN STREAMS AND ITS EFFECTS ON AQUATIC LIFE, Idaho Univ., Moscow. Coll. of Forestry, Wildlife

and Range Sciences. T. C. Bjornn, M. A. Brusven, M. Molnau, F. J. Watts, and R. L. Wallace.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 594, tion service, springited, va 2216t as PB-236 539, 84.23 in paper copp, \$2.25 in microfiche. Comple-tion Report, Idaho Water Resources Research In-stitute, Moscow, October 1974. 47 p, 19 fig, 11 tab, 10 ref. OWRT B-025-IDA(1). 14-31-0001-3876. Descriptors: Effects, Sediments, Aquatic insects, Trout, Salmon, Insect drift, Benthos, Idaho, Carrying capacity, *Sediment transport, Fish food organisms, Streams, Chinook salmon.

Identifiers: *Idaho batholith, Steelhead trout, Bedload sediment, Mountain streams, Diversity indices, Substrate material.

Natural streams were surveyed, laboratory experiments were conducted, and sediment was added to a natural stream from July 1972 to June 1974 to assess the temporal and spatial impact of granitic bedload sediment (< 1/4 inch) on insect and fish populations, and on the capability of the streams to transport sediment. Juvenile chinook salmon and steelhead trout were not adversely affected during the summer when sediment comprised up to 52% of the substrate in riffles. Reduction of pool area or volume in a small stream resulted in a reduction in summer capacity for fish proportional to the percentage of pool area or volume lost. Winter capacity of experimental streams for age-0 steelhead trout and chinook salmon was reduced when the riffles were fully sedimented. Addition of sediment to riffles temporarily reduced insect species diversity indices, but no reduction in insect abundance was observed. The Meyer-Peter Muller formula appears most applicable to esti-mate sediment transport capabilities of mountain streams in the Idaho batholith. Sediment transport during the summer, low flow period was negligible in the streams studied.

SURVEY OF EROSION AND LAND USE WITHIN THE CATCHMENT AREA OF KEEPIT DAM (AUSTRALIA): PART 1 - CLIMATE, GEOLOGY, SOILS, Soil Conservation Service of New South Wales,

Sydney (Australia). For primary bibliographic entry see Field 4D.

W75-03530

W75-03303

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS IN SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVIANITE, (IN GERMAN), Freiburg Univ. (West Germany). Limnoloaisches

Institut. For primary bibliographic entry see Field 5B. W75-03571

MECHANICAL REEF,

I Karnas US Patent No 3,845,630, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 55, November 5, 1974.

Descriptors: *Patents, *Shore protection, *Reefs, *Beach erosion, *Coastal structures, Structures, Sedimentation, Offshore platforms, Erosion, Deposition.

Identifiers: Artificial reefs, Wave action.

The mechanical reef is adapted for use in water of substantial depth (100 feet and more). As the amount of sand and particulate matter deposited below and in front of the reef increases, new sections of reef can be added periodically to previ-ously installed sections in order to increase the height of the reef. When used in this manner, the mechanical reef makes it possible to create an ac-cumulation of solid material in water of substantial depth and to build-up the accumulation to water level. The mechanical reef can be installed parallel to the area to be protected such as the shoreline, and can be used to effect a gradual widening of the shoreline. In this case it is desirable to extend the ends of the reef into the shore at the termination points in order to preclude wave movement behind the reef. The new reef is also adapted to be installed in circular or other patterns which will be

effective to protect a selected area, for example, offshore drilling equipment, etc., from wave as-sult. (Sinha-OEIS)

ANTI-EROSION DEVICE,

J. D. Williams, Sr. U.S. Patent No. 3,844,125, 4 p, 10 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1839, October 29, 1974.

Descriptors: *Patents, *Erosion control, *Beach erosion, *Shore protection, *Wind erosion, Equipment, Windbreaks, Tides, Conservation, Reclamation, Resources, Recreation. Identifiers: *Wave action, *Wind effects.

Apparatus for controlling erosion of the earth primarily in sound and beach areas by water and wind is described. The apparatus includes a frame having a substructure to be embedded in the earth and a superstructure for trapping and retaining earth which is being displaced by either water or wind. The superstructure is mounted on a frame and extends upward. It consists of parallel rows of vertically disposed posts. The posts are staggered so that water or wind follows a tortuous path and sediments are trapped and a sediment build-up oc-curs. Along coastal areas, the structure can be emplaced either in the water or on the beach to resist erosion. (Sinha-OEIS) W75-03742

BEACH-PROTECTORS,

W. Stiles, and G. V. R. Dunan. U.S. Patent No. 3,842,606, 3 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1352, October 22, 1974.

Descriptors: *Patents, *Beach erosion, *Shore protection, *Erosion control, Surf, Equipment, Beaches, Recreation, Reclamation, Conservation,

Used pneumatic type tires are arranged in horizontal and vertical rows, the vertical rows having contact with the beach to be protected, those tires in the horizontal rows being slightly elevated above the beaches. All the tires are interlocked forming a mat having solids and walled voids. Sand is deposited both in and around the tires as the surf tumbles shoreward and again as the swash and undertow gravitates seaward. The tires also form a flexible and resilient barrier to protect the beach from the turbulent waters of the surf. (Sinha-W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE.

B. A. Lamberton.

U. S. Patent No. 3,837,169, 5 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 926, No 4, p 1181-2, September 24, 1974.

Descriptors: *Patents, *Erosion control, *Shore protection, *Beaches, *Beach erosion, Equip-

A form for use in construction of an erosion control mattress or the like comprises a pair of sheets of flexible material having mutually facing interior surfaces and upper and lower cord systems, each comprising a plurality of intersecting flexible cords. Individual fasteners secure the upper cord system to one of the sheets and the lower cord system to the other sheets. The form constructed in this manner may be injected with a cementitious slurry which will inflate the form with the cord permitting separation of the two sheets for a sub-stantial but controlled amount. (Sinha-OEIS) W75-03749

Chemical Processes—Group 2K

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD

Indian Agricultural Research Inst., Nagpur, All India Soil Land Use Survey.

For primary bibliographic entry see Field 4D.

W75-03835

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAIN-STORMS, Institute for Agricultural Research, Zaria For primary bibliographic entry see Field 2B.

2K. Chemical Processes

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS, Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering. For primary bibliographic entry see Field 5A. W75-03305

SELECTED PHYSICOCHEMICAL PROPER-TIES OF BASALTIC ROCKS, LIQUIDS, AND CI.ASSES Los Alamos Scientific Lab., N. Mex.

For primary bibliographic entry see Field 8H. W75-03419

AUTOMATIC DOSAGE OF SULFATES BY AN MIMPROVED NEPHELOMETRIC METHOD (DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),

Institut d'Hygiene et d'Epidemiologie, Brussels (Belgium).

For primary bibliographic entry see Field 5A. W75-03536

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOM-PONENT AQUEOUS SOLUTIONS, Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique.

J. Sangster, and F. Lenzi. The Canadian Journal of Chemical Engineering, Vol 52, No 3, p 392-396, June, 1974. 2 tab, 22 ref.

Descriptors: *Mathematical models, Solutions, *Electrolytes, Solu *Aqueous solutions, modynamic behavior. Solutes, Thermodynamics, ions, Model studies, Ther-

Identifiers: Water activity, Solute activity coeffi-

Two important thermodynamic properties of aqueous solutions are the solute activity coefficient (gamma) and the water activity. A number of methods of predicting solute activity coefficient and water activity for multicomponent aqueous solutions exist. These vary by complexity, accuracy, and applicability. Methods of prediction discussed are those by Reilly, Wood, and Robinson (1971), Robinson and Bower (1965), Meissner and Kusik (1973), and Zdanovskii-Stokes-Robinson (1973). The first three are limited to solutions of electrolytes, while the fourth also applies to solutions containing non-electrolytes. (Prague-FIRL) W75-03540

AN AUTOMATED METHOD FOR DETER-MINATION OF CHLORIDE AND SULFATE IN FRESHWATER USING CATION EXCHANGE

AND MEASUREMENT OF ELECTRICAL CON-

Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst. For primary bibliographic entry see Field 5A.

W75-03576

DETERMINATION OF TOTAL WATER HARD-NESS BY CONDUCTOMETRIC TITRATION WITH COMPLEXING AGENTS (DETERMINAREA DURITATII TOALE A APEI PRIN TITRARI CONDUCTOMETRICE CU COMPLEXONI), Institutul Politehnic, Iasi (Rumania).

For primary bibliographic entry see Field 5A.

STUDY OF ADSORPTION CHARAC-TERISTICS OF TRACES OF CHROMIUM(III) AND (VI) ON SELECTED SURFACES, Louisiana State Univ., Baton Rouge. Dept. of

Chemistry. For primary bibliographic entry see Field 5A.

THE OPENING UP OF INSOLUBLE OXIDES TANTALUM, NIOBIUM, CHROMIUM, ALU-MINIUM, AND OTHERS), WITH LIQUID SELENIUM DIOXIDE, Philips Gloeilampenfabrieken N.V., Eindhoven

(Netherlands). For primary bibliographic entry see Field 5A.

SELECTIVE DETERMINATION OF IRON IN ALLOYS BY REACTION WITH 2,3-PYRIDINEDIOL AND RING COLORIMETRY, M.M.H. College, Ghaziabad (India). Dept. of

I. C. Mehra, and G. R. Chhatwal. Analytica Chimica Acta, Vol 72, No 1, p 194-195, September, 1974. 1 tab, 2 ref.

Identifiers: *Analytical techniques, *Iron, *Metals, *Colorimetry, Chemical analysis, Testing procedures, Laboratory tests, Pollutant identifica-

This study found that 2,3-pyridinediol can be more usefully and conveniently employed for the selec-tive determination of iron, especially when present in trace concentrations, when it is used in conjunction with ring-oven colorimetry. The intensity of the ring determinations were compared with a standard scale, which had been prepared by taking 7 aliquots between 1 and 12 microliters of standard Fe(III) solution through the procedure. Tests carried out in the range 0.18-0.72 micrograms of Fe(III) gave results which showed errors ranging from 0 to 3%. The range for the determination of iron was 0.15-0.7 micrograms in the total ring; outside this range, visual comparison was not feasi-ble. The validity of the procedure was tested for two different alloys after dissolution in hydrochloric acid. The interferences of various ions were studied by developing rings for 0.6 micrograms of Fe(III) in the presence of varying amounts of foreign ion up to 15 micrograms. (Pulliam-Van-derbilt) W75-03623

SEPARATION OF COPPER (II) FROM URANI-UM (VI) AND MANY OTHER ELEMENTS BY CATION-EXCHANGE CHROMATOGRAPHY IN ACETONE-HYDROBROMIC ACID MEDIA -IMPROVED SELECTIVE SEPARATION OF

National Chemical Research Lab., Pretoria (South Africa).

For primary bibliographic entry see Field 5A. W75-03628

PHOTOMETRIC TITRATION OF BERYLLI-UM(II) WITH 5-SULFOSALICYLIC ACID. Amsterdam Univ. (Netherlands). Lab. for Analyti-

cal Chemistry.
G. DenBoef, W. E. Van der Linden, and N. M.

Analytica Chimica Acta, Vol 69, No 2, p 469-472, April, 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Analytical techniques. *Spectrophotometry, *Beryllium, *Metals. *Chelation, Chemical analysis, Testing procedures, Laboratory tests, Volumetric analysis, *Pollutant identification. techniques, *Metals, Testing

Previous data had suggested that a selective photometric titration of beryllium(II) with 5-sulfosalicylic acid should be possible. No endpoint was expected for the titration at the point of 1:1 complex formation, since the ratio of the molar absorptivities of BeL2 and BeL is about 2 at all wavelengths. However, at 325 nm an endpoint was expected corresponding to 1:2 complex formation if certain requirements involving the product of the conditional stability constants, which could only be calculated roughly, and the Be(II) concentration were met. To prevent other metal ions reacting with the ligand under the experimental conditions or causing precipitation of hydroxides, EDTA or a similar compound was added as a masking agent. Results of determinations of Be(II) alone and in the presence of other metal ions sup-posed to complex with the ligand were presented. Iron(III) interfered because of the large absorption by the Fe(III)-EDTA complex at 325 nm. The optimal pH was found to be 9. Successful determinations could be carried out at the 0.0001 M level. The titration appeared to be rather selective, and could be increased by removing interfering metal ions. (Pulliam-Vanderbilt) W75-03629

THE EXTRACTION OF NICKEL FROM VARI-OUS SALT SOLUTIONS WITH OXINE IN

CHLOROFORM, Shizuoka Univ., Hamamatsu (Japan). Faculty of Engineering. S. Oki, and I. Terada.

Analytica Chimica Acta, Vol 69, No 1, p 220-223, March, 1974. 3 fig, 1 tab, 4 ref.

Descriptors: *Nickel, *Alkali metals, *Salts, *Aqueous solutions, *Separation techniques, Laboratory tests, Testing procedures, Ab-sorbance, *Pollutant identification.

The extraction of nickel from aqueous solutions containing various common inorganic alkali metal salts was studied by means of absorbance measurements of the organic extracts, and the results were compared with extraction from perchlorate solutions. The absorbance spectra of the nickeloxine complexes extracted into oxine solutions in chloroform from the various salt solutions were practically the same as those from the perchlorate solutions. The absorbance by an excess of oxine was negligible at 400 mm. The absorbance-pH curves were essentially analogous to those of the perchlorate system; they had a low constant absorbance in the low pH region, but a high constant absorbance in the high pH region where nickel was completely extracted. The rising parts of the absorbance-pH curves differed from each other, depending on the kind and concentration of the salt used. (Jernigan-Vanderbilt) W75-03630

METHOD FOR DETERMINATION OF SELENI-IUM, ARSENIC, ZINC, CADMIUM, AND MER-CURY IN ENVIRONMENTAL MATRICES BY NEUTRON ACTIVATION ANALYSIS, National Bureau of Standards, Washington, D.C.

Activation Analysis Section.
For primary bibliographic entry see Field 5A.

Field 2—WATER CYCLE

Group 2K—Chemical Processes

THERMODYNAMIC PROPERTIES OF SEA SALT SOLUTIONS, California Univ., Berkeley, Dept. of Chemical En-

gineering. L. A. Bromley, D. Singh, P. Ray, S. Sridhar, and S. M. Read.

AIChE Journal, Vol 20, No 2, p 326-336, March, 1974. 4 fig, 9 tab, 27 ref.

Descriptors: *Thermodynamic, *Saline water systems, *Thermal capacity, Equations, Electrolytes, Enthalpy, Aqueous solutions.

Based on new experimental data presented for the boiling point elevation of natural sea water solutions, smoothed tabular values are presented for boiling point elevation (BPE), osmotic coefficient, water activity, osmotic pressure, and minimum separation energy to 200C and 12% sea salt. The concentration of sodium chloride solutions having the same water activities as sea salt solutions is also presented. Rigorous thermodynamics and the equations for strong electrolytes by Bromley (1973) were used for the correlation together with previusly obtained heat capacity and enthalpy data and equations. A simplified equation is presented boiling point elevation. (Snyder-California, Davis) W75-03808

HYDROGEN EVOLUTION ON BETA III

TITANIUM ALLOY, California Univ., Los Angeles. School of Engineering and Applied Science. D. L. Dull, and K. Nobe.

Corrosion, Vol 30, No 8, p 291-295, August 1974, (University of California Water Resources Center Project UCAL-WRC-S-144). 5 fig, 4 tab, 12 ref.

Descriptors: *Desalination processes, *Sea water, *Corrosion, *Titanium, Alloys, Metals, *Chemical reactions, Hydrogen, Hydrogen sulfide.

The rate of hydrogen evolution on Beta III titanium alloy in 1.0, 2.5, 5.0, 7.5, and 10.0 N sulfuric acid at 23, 45, 60, and 75 C (73, 113, 140, and 167 F) has been investigated. The cathodic Tafel slopes were 60, 64, 67, 70 mV, respectively, at each temperature. The reaction order was first order with respect to the concentration of hydrogen ions. The chemical recombination mechanism for the hydrogen evolution reaction using the Temkin adsorption with activated heat of adsorption is consistent with the experimental data. The corrosion rate increased with increase in both acid concentration and temperature. The activation energies for corrosion were 22.1, 20.8, and 19.3 kcal/mole for corrosion in 1.0, 2.5, and 5.0 N H2SO4, respectively, and 15.9 kcal/mole in 7.5 and 10.0 N H2SO4. (Snyder-California, Davis) W75-03809

CHEMISTRY FOLLOWING FOREST FIRE AND UREA FERTILIZATION IN NORTH-CENTRAL WASHINGTON,

Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment Station.

A. R. Tiedemann.

Available from Library Pacific Northwest For. and Range Expt. Sta., Box 3141, Portland, Ore. 97208. U.S.D.A. Forest Service Research Note PNW-203, 1973. 20 p, 8 fig, 1 tab, 23 ref.

Descriptors: Streams, *Fertilizers, Erosion control, Forest fires, *Water chemistry, *Nitrogen, *Nitrates, *Urea, Ammonia, Calcium, Magnesium, Sodium, Potassium, Hydrogen ion concentra-Alkalinity, Electrical conductivity. Washington.

Identifiers: Entiat Experimental Forest(Wash).

During 2 years of study, nitrate-N in streamflow increased from background levels of 0.005 part per million (p.p.m.) in a control stream to 0.042 and 0.310 p.p.m. in streams from burned and burned,

urea-fertilized watersheds, respectively. Cation concentration increased on the burned, unfertilized watershed, but because of dilution effects, decreased to levels of the control stream on the burned, fertilized watershed. Neither burning nor urea fertilization caused increases in nitrogenous constituents to levels above those recommended for municipal water supplies. Concentrations of nitrate-N observed indicate that losses of N in this form will have a negligible effect on future productivity of these forest ecosystems. (Forest Service) W75-03822

2L. Estuaries

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH), Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography. For primary bibliographic entry see Field 5B. W75-03335

1971 SALMON RIVER ESTUARY RESOURCE USE STUDY, Oregon Fish Commission, Salem. Div. of Manage-

ment and Research. For primary bibliographic entry see Field 6C. W75-03344

1971 SAND LAKE ESTUARY RESOURCE USE STUDY,

Oregon Fish Commission, Salem. Div. of Management and Research. For primary bibliographic entry see Field 6C. W75-03345

1971 ALSEA RIVER ESTUARY RESOURCE USE STUDY.

Oregon Fish Commission, Salem. Div. of Management and Research. For primary bibliographic entry see Field 6C.

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS,

Delaware Univ., Newark. Academy of Natural Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region. For primary bibliographic entry see Field 6G. W75-03352

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POL-LUTION AND TRANSFER RELATIONSHIPS, Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships.
For primary bibliographic entry see Field 5B.

W75-03440

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY, Academy of Natural Sciences of Philadelphia, Pa.

For primary bibliographic entry see Field 6G. W75-03441

PERSPECTIVES ON COASTAL MANAGE-MENT-MARINE TRADES AND THE COASTAL

Rhode Island Univ., Kingston. Coastal Resources Center. For primary bibliographic entry see Field 6B. W75-03458

UNNATURAL SHORELINE, California State Univ., San Francisco. Dept. of Geology. For primary bibliographic entry see Field 5G. W75-03459

SALTWATER INTRUSION INTO A FLOWING

STREAM, Louisiana State Univ., Baton Rouge. Coastal Studies Inst.

W. R. Waldrop, R. C. Farmer, and P. A. Bryant. Available from the National Technical Information Service, Springfield, Va. 22161, as AD-779 849, \$3.75 in paper copy, \$2.25 in microfiche. Technical Report No 161, May 1974. 36 p, 9 fig, 1 tab, 12 ref, 1 append. ONR NR 388 002. ONR Contract No N00014-69-A-0211-0003.

Descriptors: *Saline water-freshwater interfaces, *Finite element analysis, *Mathematical models, Saline water intrusion, Parametric hydrology, Tidal streams, Coasts, Encroachment, Eddies, Mathematical studies, Streams, Flow, *Louisiana. Identifiers: *Finite-difference model, Bayou Lafourche(La).

A parametric study of the flow of saline water intrusions which are driven into rivers by tidal fluctuations was accomplished with a mathematical model. Specifically, the saltwater intrusion at the bottom of Bayou Lafourche was studied. Empirical eddy transport was used, and available field data served as boundary conditions. The finite-difference model described unsteady flow variation in two spatial dimensions. The use of the third spatial dimension was not necessary to describe the physical phenomena governing the intrusion. (Jess-ISWS) W75-03634

THE COASTAL UPWELLING CYCLE ON A BETA-PLANE: HYDRODYNAMICS AND THER-MODYNAMICS, Florida State Univ., Tallahassee. Dept. of

Meteorology.

Available from the National Technical Informa-Avanable from the National Technical Information Service, Springfield, Va 22161 as AD-778 761, \$6.25 in paper copy, \$2.25 in microfiche. Report No 121, March 1974, 141 p, 27 fig, 2 tab, 95 ref, 4 append. ONR NONR-N00014-67-A-0235-0002; NSF GA-29734.

Descriptors: *Upwelling, *Oceanography, *Coasts, *Model studies, Circulation, Oceans, Mixing, Movement, Ocean currents, Mathemati-*Oceanography. cal models, Continental shelf, Air-water interfaces, Water temperature, Numerical analysis, Stratification.

Identifiers: *Oceanic fronts.

Vertically-averaged equations for velocity, densi-ty, and thickness fields were formulated for a time-dependent, nonlinear, two-layer model of coastal upwelling. The model included the effects of the earth's rotation, bottom topography, an atmospheric pressure gradient, short and long-wave radiation, latent and sensible heat flux, horizontal and vertical turbulence, and both barotropic and baroclinic modes. Surface, interfacial, and bottom stresses and vertical mixing based on a parame-terization of boundary and shear generated turbulence were incorporated in the model. Depth of the mixed layer, stratification, and sea surface tem-peratures were predicted explicitly. Solutions to the vertically-averaged momentum equations for the two-dimensional case were obtained using a highly efficient semi-implicit numerical scheme and a discrete variation telescoping grid which allowed high resolution near the coast. Upon reconstruction of the total flow fields for model cases with and without bottom topography, solar heating, and continuous wind forcing, several features observed in actual coastal upwelling situations were reproduced and investigated, including: (1) strong sea surface temperature gradients that ap-

WATER SUPPLY AUGMENTATION AND CONSERVATION—Field 3

Saline Water Conversion—Group 3A

pear within 10-50 km of the coast; (2) the equatorward surface jet that is found within the baroclinic Rossby radius of deformation of the coast and the poleward undercurrent which appears over the continental shelf; (3) the two cyclonically rotating cells reported by Mooers et al. (1973), as situated in a plane normal to and within 10-50 km of the coast. (Humphreys-ISWS) W75-03642

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS, For primary bibliographic entry see Field 5G. W75-03678

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE, Maine State Planning Office, Augusta. Coastal Planning Group. For primary bibliographic entry see Field 6E. W75-01489.

STATE UNIVERSITY SYSTEM OF FLORIDA SEA GRANT PROGRAM 1972. For primary bibliographic entry see Field 6E. W75-03714

SEA GRANT PROGRAM 1973, STATE UNIVER-SITY SYSTEM OF FLORIDA. Florida Univ., Gainesville. Marine Advisory Program. For primary bibliographic entry see Field 9A. W75-03720

ANTI-HEAVE PROTECTIVE SYSTEM, Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee) For primary bibliographic entry see Field 8B. W75-03732

MECHANICAL REEF, For primary bibliographic entry see Field 2J. W75.03738

ANTI-EROSION DEVICE, For primary bibliographic entry see Field 2J. W75-03742

BEACH-PROTECTORS,For primary bibliographic entry see Field 2J. W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE, For primary bibliographic entry see Field 2J. W75-03749

ULTRAVIOLET ABSORPTION/SALINITY COR-RELATION AS AN INDEX OF POLLUTION IN INSHORE SEA WATERS, University Coll. of North Wales, Manai Bridge. Marine Sciences Lab. For primary bibliographic entry see Field 5A. W75-03767

A CHECK LIST OF THE BIOTA OF LOWER CHESAPEAKE BAY, Virginia Inst. of Marine Sciences, Gloucester Point. For primary bibliographic entry see Field 5C. W75-03786

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA, New Hampshire Univ., Durham. Dept. of Zoolo-

For primary bibliographic entry see Field 5C. W75.03787

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

FUTURE OF DESALTING IS BRIGHT BUT COSTS MUST DROP, Water and Wastes Engineering, New York. C. W. Heckroth.

Water and Wastes Engineering, Vol 11, No 7, p 20-23, 52-54, 1974. 15 fig, 1 tab.

Descriptors: *Water supply development, *Cost analysis, *Desalination, Water resources development, Desalination processes, Distillation, Membrane processes, Economic prediction, Desalination plants, Flash distillation. Identifiers: Multistage flash process.

Desalting has become a growing source to meet increased water demand. In the U.S., over 800 desalting plants of over 25,000 gpd capacity are under construction or in operation. These units are capable of producing over 450 mgd of fresh water for cities and industries. Desalting has many advantages. In addition to supplying new water, it may also improve the water quality. Furthermore, it may provide an attractive form of drought insurance. A variety of processes are used in desalting with distillation furnishing most (95%) of the existing world capacity. About 2/3 of the capacity of the distillation plants use the multistage flash process. Distillation is used almost exclusively for desalting sea water, with membrane processes used only for brackish water. Graphic analysis of capital and operating cost is provided for an elec-trodialysis plant, ED plant, ion exchange plant, and a reversed osmosis plant. Desalting costs have reduced significantly over time, and are projected to drop even further. Several methods to reduce these costs are noted: (1) improved desalting technology, (2) reduction in energy costs, (3) more efficient use of energy, (4) geo-thermal plants, (5) economies of scale, and (6) staged construction. (Schroeder-Wisconsin) W75-03356

CONCENTRATION OF POLARISATION IN REVERSE OSMOSIS FLOW SYSTEMS UNDER LAMINAR CONDITIONS. EFFECT OF SURFACE ROUGHNESS AND FOULING, Birmingham Univ. (England). Dept. of Chemical Engineering.

For primary bibliographic entry see Field 5D. W75-03375

MEMBRANES AND MODULES FOR THE WATER DESALINATION WITH REVERSE OSMOSIS (MEMBRANEN UND MODULE FUR DIE WASSERENTSLZUNG MIT UMGEKEHRTER OSMOSE),

U. Ermert, and H. D. Bauermann. Meeresteckik, Vol 5, No 4, p 125-128, August, 1974. 6 fig, 4 ref.

Descriptors: *Reverse osmosis, *Filters,
*Membranes, *Separation techniques,
*Desalination, *Waste water treatment, Filtration,
Equipment, Design.
Identifiers: Ultrafiltration, Plate and frame

module, Wound spiral module, Pipe module, Hollow fiber module.

Beginning with the demarcation line between reverse osmosis (hyperfilitation) and ultrafiltration, the structure and materials of the usual types of membranes are discussed. The membranes are presented as complete modules. A comparison is made between the different modules including the plate and frame module, the wound spiral module, the pipe module, and the hollow fiber module. The various aspects of choosing membranes and modules are considered. (Orr-FIRL)

DESALINATION - NEW WATER FOR OLD (ENTSALZUNG-FRISCHWASSERVERSOR-GUNG UND ABWASSERAUFBEREITUNG), United Kingdom Atomic Energy Authority, London (England). For primary bibliographic entry see Field 5D. W75-03385

DISTILLATION APPARATUS, Aqua-Chem, Inc., Milwaukee, Wis. (assignee) A. B. Steinbruchel. US Patent No 3,849,259, 10 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1209, November 19, 1974.

Descriptors: *Patents, *Desalination, *Evaporators, *Distillation, *Condensation, Sea water, Thin films, Equipment, Heat exchangers.

A thin film evaporator having a plurality of effects arranged in a vertical array and connected in a series relationship is described. Each effect includes heat exchange tubes through which vapor is passed while the feed liquid is distributed as a thin film over their outer surfaces. A portion of the liquid fed over heat exchange tubes as a thin film is vaporized to condense vapor passed through the tubes. The unevaporated feed liquid is passed through successive effects and the vapor generated in each effect is employed as the heating vapor for the next effect. The heat exchange tubes of at least one of the initial effects is arranged vertically and those in the balance of the effects are arranged generally horizontally and extend radially with their outlet ends facing condensate collecting chambers disposed within a central core. Feed water preheaters extend vertically through a plurality of collecting chambers with a feed liquid take-off for each phase. (Sinha-OEIS) W75-03735

POWER GENERATION FROM HOT BRINES, Geothermal Investment Co., Pasadena, Calif. (assignee) For primary bibliographic entry see Field 4B. W75-03737

MULTISTAGE FLASH DISTILLATION, General Atomic Co., San Diego, Calif. (assignee) P. H. Sager, Jr. US Patent No 3,844,899, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2081, October 29, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Flash distillation, *Evaporators, *Condensers, Evaporation, Condensation, Equipment, Sea water, Brine, Freshwater, Waste water treatment.

A parallel train, multistage flash evaporation unit requires only a single brine heater to provide the heat necessary for operation of all stages for all parallel trains. Operation of the system in the described manner results in increased capacity of the product output from heat input of particular conditions. The first incoming brine stream is heated and injected into the flash evaporation section of the highest pressure stage of the longest train. A second brine stream is heated by passage through the condenser sections of the longest train, withdrawn from the highest pressure stage,

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Group 3A—Saline Water Conversion

and injected into the evaporation section of the highest pressure stage of the next longest train. The heated condenser streams from each train are likewise injected into the next shorter train. Each flash distillation stage includes an evaporation chamber or section into which the heated solution being treated is fed and caused to partially flash to vapor. A condenser section is located in the upper portion of each stage, and a distillate take-off system is disposed vertically below the condenser tubing to catch the condensed water which falls there via gravity. In each train the heated brine flows from right to left successively through the evaporation chambers of each stage in the train. At the same time, cooler brine is passed through the interconnected piping in the condenser sections flowing from left to right, in countercurrent flow to the direction of the heated brine. (Sinha-OEIS) W75-03739

METHOD OF PREPARING WATER PURIFICA-TION MEMBRANES,

National Aeronautics and Space Administration. Washington, D.C.

J. C. Fletcher, J. R. Hollahan, and T. Wydeven. U.S. Patent No. 3,847,652, 4 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 700, November 12, 1974

Descriptors: *Patents, *Membranes, *Reverse osmosis, *Water purification, *Desalination, *Water reuse, Thin films, Freshwater, Potable water. Identifiers: *Polymerization.

A process is described for the production of a reverse osmosis membrane. The membrane is prepared by plasma chemical synthetic methods that consist of disposing a microporous substrate in an enclosed space and generating a plasma of an inert gas within the enclosed space. The following steps consist of directing symmetrically a gaseous stream of an unsaturated organic compound including at least one allyl group toward and around the substrate and then directing the plasma symmetrically and countercurrently toward the gase-ous stream and the substrate. The unsaturated organic compound is polymerized with the aid of the plasma and deposited on the substrate as a uniform polymer film to form the membrane. (Sinha-OEIS) W75-03756

LONG TERM INVESTMENT CONSIDERA OF CONJUNCTIVE DESALTING SYSTEMS, California Univ., Los Angeles. School of En-

California Univ., Los Angoles gineering and Applied Science. J. M. English, and N. A. Young. Desalination, Vol 13, p 359-371, 1973, (California

Water Resources Center Project UCAL-WRC-W-305), 3 tab, 15 ref.

Descriptors: Economics, *Cost analysis, *Desalination plants, Aqueducts, *California, Identifiers: *Diablo Canyon(Calif).

Previous research which dealt with the desirability of considering water projects in a long range con text, the measurement and costs of technological text, the measurement and costs of technologies, and the value of preserving flexibility in future decision making has been combined and applied to the evaluation of the proposed prototype 40-mgd Diablo Canyon desalination plant. An alternative to the desalination plant is a very large scale aqueduct. In this paper the two projects are evaluated together as complementary components of a long range project against the alternative of earlier construction of the aqueduct. The analysis concerns the interest rate, growth rate, demand elasticity, planning horizon, number of planning periods, and area growth rate in parametric form. A simplified numerical example is given. (Snyder-California, Davis) THERMODYNAMIC PROPERTIES OF SEA

California Univ., Berkeley. Dept. of Chemical Engineering. For primary bibliographic entry see Field 2K. W75-03808

HYDROGEN EVOLUTION ON BETA III TTTANIUM ALLOY,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 2K.
W75-03809

TWENTY YEARS OF WORK ON SOLAR DISTILLATION AT THE UNIVERSITY OF CALIFORNIA.

California Univ., Berkeley. Sea Water Conversion

E. D. Howe, and B. W. Tleimat. Solar Energy, Vol 16, p 97-105, 1974, (California Water Resources Center Project UCAL-WRC-S-106), 8 fig. 13 ref.

Descriptors: *Solar distillation, *Solar distillation, Desalination processes, Energy, *California, Distillation, *Research facilities, Laboratories, Potable water, Design, Desalination plants.

Solar Distillation investigations at the Sea Water Conversion Laboratory, University of California, began in January 1952 and have continued to the present time. These studies have led to the development of still units of relatively small size, designed for furnishing potable water to isolated residences or small communities. Designs have residences or small communities. Designs have been completed using wooden frames, precast concrete frames, and precast styrofoam basins. In-formation is presented on the construction and performance of the several units; it indicates the need for more effective utilization of solar energy; and it offers a conceptual design of a solar collec-tor for furnishing low-pressure steam for operation of a seawater distillation plant of adv design with a capacity of 10,000 U. S. gal. (37 x 85 cu m) per day. (Snyder-California, Davis)

NEW MULTI-PROBE TEMPERATURE-PROFILE MEASUREMENT SYSTEM--THE 'THERMISTOR COMB', California Univ., Berkeley. Sea Water Conversion

N. Lior, J. Leibovitz, and A. Laird. SWCL Report No 73-2, Water Resources Center Desalination Report No 56, December, 1973. 7 fig,

Descriptors: *Desalination, Temperature, *Measurement, *Flash distillation, Instrumenta-

Identifiers: *Thermistors, *Temperature distribution, *Temperature differentials.

In many cases, a multi-probe simultaneous-measurement system has considerable advantages over a traversing-probe system. A detailed description of the design, development, and construction of such a multi-probe system, incorporating 0.25-mm-diameter thermistor beads mounted in 0.5-mm outside diameter hypodermic tubes, is presented. This system was used for the measurement of temperatures and temperature differentials in the determination of temperature distributions. Some of the techniques such as the welding, insulation and handling of fine wires (0.025 mm diameter, or one mil), are applicable in other systems. The system has been used to measure temperature distributions with an accuracy of plus or mimus 0.02C in a model of a flash-evaporator stage used for research on distillation of saline water. The methods of measurement and experi-mental results are presented. Results indicate that the system is very well-suited for the determination of temperature distributions in single- and two-phase fluids (whether electrically conductive or not), particularly for small overall temperature differentials. (Snyder-California, Davis)

3B. Water Yield Improvement

OPPORTUNITIES FOR WATERSHED MANAGEMENT IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst. For primary bibliographic entry see Field 4D. W75-03326

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. I. WATER YIELD RESPONSE AND EFFECTS ON OTHER RESOURCES. Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. A. R. Hibbert, E. A. Davis, and D. G. Scholl. Forest Service Research Paper RM-126, July 1974. 36 p. 26 fig. 4 tab, 84 ref.

Descriptors: *Watershed management, *Arizona, *Chaparral, *Water yield improvement, Brush control, Soil erosion, Habitat improvement, Burning, Herbicides, Sediment yield, Erosion control, Land management, Arid lands, Forest fires, Wil-dlife, Brushlands, Chemcontrol, Forages, Grasslands, Water pollution, Streams, Browse utiliza-

On areas favorable for treatment, conversion to grass reduces the fire hazard and increases water yield and forage for livestock. If treatment areas are kept small and interspersed with native chapar-ral, protective cover and browse for game animals will always be available nearby, and the edge effect created by the openings will enhance the overall environment for wildlife. Chaparral control methods that have proved effective in Arizona are rootplowing, prescribed burning, chemicals, and chemicals in combination with the others. Stream water from treated watersheds shows moderate to low contamination by herbicides. Over the long run, conversion should reduce erosion by reducing or eliminating the heavy erosion cycle set off by periodic wildfires in unmanaged chaparral. (See also W75-03573) (Witt-IPC) W75-03572

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS, Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. T. C. Brown, P. F. O'Connell, and A. R. Hibbert. Forest Service Research Paper RM-127, August 1974. 28 p, 3 fig, 10 tab, 22 ref.

Descriptors: *Chaparral, *Economic justification, *Cost analysis, *Arizona, *Watershed management, *Water yield improvement, Brush control, Erosion control, Habitat improvement, Burning, Frosion control, Habitat improvement, Burming, Herbicides, Arid lands, Brushlands, Grasslands, Forest fires, Wildlife, Recreation facilities, Soil erosion, Land management, Multiple-purpose pro-jects, Forages, Browse utilization, Cost-benefit analysis, National forests. River(Arizona),

Identifiers: Salt River(Arizona).

Chaparral covers approximately 850,000 acres on National Forest land in the Salt and Verde River Watersheds of central Arizona. An inventory watersness or central Arizona. An inventory revealed 139 chaparral areas totaling 332,796 acres that meet certain crown cover, slope, and managerial criteria for conversion. The costs of converting portions of these areas to grass and maintaining the conversion over a 50 year period were compared with the benefits to society in terms of increased water yield and forage for livestock, and reduced firefighting costs. Using fire as the main conversion tool, 96 acres have a benefit-cost ratio greater than 1; using a soil-ap-

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plied herbicide, 72 areas meet that economic criterion. Proper management should favorably affect soil movement, wildlife habitat, and esthetics. Recreation use would be unaffected in most areas. (See also W75-03572) (Witt-IPC) W75-03573

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITATION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2, North American Weather Consultants, Goleta, Calif.

R. D. Elliott, J. F. Hannaford, and R. W. Shaffer. Available from the National Technical Information Service, Springfield, Va. 22161, as PB-232 132, \$7.00 in paper copy, \$2.25 in microfiche. Report No NAWC 15-18-2, December 31, 1973. 183 p, 20 fig, 6 tab, 4 ref, 2 append. Bureau of Reclamation 14-06-D-7368.

Descriptors: *River basins, *Weather modification, *Artificial precipitation, *Streamflow, *Data collections, *Meteorology, Cloud seeding, Precipitation(Atmospheric), Atmosphere, Hydrology, Orography, Snow, Snowpacks, Storm structure, Silver iodide, Nucleation, Runoff, Watersheds(Basins), Pacífic Coast Southwest US, Rocky Mountain region. Identifiers: *Cloud seeding model.

Volume 2 presented the cloud seeding potential for increasing streamflow from five major rives basins: Upper Missouri, San Joaquin, Deschutes, Bear-Wasatch, and Yakima. October-April hourly precipitation data were associated with appropriate rawinsonde data and the precipitation-cloud top temperature curves were plotted. From the curves, critical temperatures (for susceptibility to seeding) were determined for each massif. The area-of-effect model was employed in determining predicted seeded precipitation cloud top temperature curves, and the predicted curves were fitted to the historical curves based on the predicted not seeded curve in the critical temperature and colder range. The seeding potential was then calculated from the difference between the predicted curve and the observed historical curve, and the frequency of cases. Mean elevations were specified for the upwind and downwind transition zones and crest zones. With the data, potential incremental streamflow was computed for 1951-1952 to 1970-1971. Details of the meteorological and hydrological approach were presented in Volume 1. Appendices contain extensive tabulations of data. (Humphreys-ISWS)

3C. Use Of Water Of Impaired Quality

GUIDELINES FOR LAND DISPOSAL OF FEEDLOT LAGOON WATER. Kansas State Univ., Manhattan. Cooperative Extension Service. For primary bibliographic entry see Field 5G. W75-03306

EFFECT OF SALT WATER INGESTION ON PREGNANCY IN THE EWE AND ON LAMB SURVIVAL.

Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutritional Biochemistry.

ional Biochemistry.

B. J. Potter, and G. H. McIntosh.
Australian Journal of Agricultural Research, Vol.
25, No. 6, p. 909-917, November 1974. 2 fig. 3 tab.

Descriptors: *Sheep, *Reproduction, *Salt tolerance, *Stock water, Saline water, Animal physiology, Aging(Biological), Livestock, Animal

pathology, Mortality, Water pollution effects, Australia.

Identifiers: Progesterone, Blood plasma, Ion concentration, Lamb survival.

The effect of drinking saline water on the reproductive performance of ewes was investigated with reference to age, circulating hormones, electrolytes and lamb survival rate. Pregnant sheep, particularly those carrying twin fetuses, appear to be less able to adapt to high levels of sodium chloride in drinking water than non-pregnant sheep, and the problem is exacerbated by increasing age. Progesterone levels in blood plasma were higher in twin-bearing ewes than in ewes with single lambs, and drinking saline water augmented the increase in older ewes. Plasma levels of potassium and chloride were higher and calcium and magnesium lower in pregnant ewes which received saline water. These changes in blood plasma composition were associated with complicated births, and neonatal mortality of lambs. (Levick-CSIRO)

SALT TOLERANCE IN THE WILD RELATIVES
OF THE CULTIVATED TOMATO: WATER
BALANCE AND ABSCISIC ACID IN LYCOPERSICON ESCULENTUM AND L. PERUVIANUM
UNDER LOW AND HIGH SALINITY.

SICON ESCULENTUM AND L. PERUVIANUM UNDER LOW AND HIGH SALINITY, Negev Inst. for Arid Zone Research, Beersheba (Israel). Div. of Life Sciences.

M. Tal, and U. Gavish.

Aust J Agric Res, Vol 24, No 3, p 353-361, 1973. Identifiers: *Abscisic acid, Conductivity, Density, Fluid, Guttation, Lycopersicon-esculentum, Lycopersicon-peruvianum, Resistance, Root, *Salinity, *Salt tolerance, Stomatal, *Tomatos, Transpiration, *Water balance, Wild.

The cultivated tomato L. esculentum and the more salt-tolerant wild species L. peruvianum were used. Transpiration of whole plants and detached leaves, stomatal density and opening, and abscisic acid level were measured for the 2 species grown under both control and saline conditions. Root resistance to water flow and conductivity of guttation fluid were compared only for plants growing in the control solution. Transpiration of whole plants was higher in wild plants grown in the control solution, but decreased more under salinity. Wild plants had fewer stomata per unit leaf area, but these opened wider in the control solution and closed more in the saline solution as compared with the cultivated ones. Root resistance to water flow and conductivity of guttation fluid were higher in the wild plants. The abscisic acid level was higher in the cultivated species and increased somewhat in both plant types under salinity. The significance of these findings in relation to the greater adaptability of L. peruvianum to stress is discussed.—Copyright 1974, Biological Abstracts, Inc.

MILL EFFLUENT AND ITS UTILISATION FOR CROP CULTIVATION PURPOSES, For primary bibliographic entry see Field 5D. W75-03585

INFLUENCE OF SALINE DRINKING WATER ON MINERAL BALANCES IN SHEEP. Commonwealth Scientific and Industrial Research Organization, Adelaide (Australia). Div. of Nutri-

tional Biochemistry. F. M. Tomas, G. B. Jones, B. J. Potter, and G. L.

Langstord.
Aust J Agric Res, Vol 24, No 3, p 377-386, 1973.
Identifiers: Excretion, Filtration, Glomerular,
*Mineral balance(Animals), Plasma, *Saline
water, *Sheep, Urin, Potable water.

The influence of NaCl ingestion via the drinking water upon the mineral balance in sheep was examined. Merino ewes (4) were offered rainwater containing zero, 0.8 or 1.3% NaCl as the only source of drinking water. After correction for variations in mineral intake, the data showed that the urinary excretion of Ca, Mg, K, P, Na and chloride was increased by saline water ingestion. The fecal excretion of Ca, Mg and P was not affected by the inclusion of NaCl in the drinking water, but fecal K was decreased and Na and chloride increased. The drinking of saline water by the sheep resulted in a decline in the Ca, P and K balances, an increase in the Na and chloride balances, and no change in the Mg balance. The Na balance was negative for the rainwater treatment, but all other balances were positive. Saline water ingestion also caused an increase in the glomerular filtration rate, a decline in plasma Mg levels and an increase in plasma K levels. Saline water ingestion causes alteration in the pathways of excretion of minerals and the mineral balances in sheep, but the changes would appear to be of insufficient consequence to have detrimental effects.—Copyright 1974, Biological Abstracts, Inc. W75-03637

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION, For primary bibliographic entry see Field 5D. W75-03743

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN), Kiev Inst. of Nutritional Hygiene (USSR). Physicochemistry Lab. For primary bibliographic entry see Field 5B. W75-03846

3D. Conservation In Domestic and Municipal Use

MUNICIPAL WASTES - A DESIGN FOR AN IN-TEGRATED PLANT TO MAKE A PROFIT, New South Wales Univ., Kensington (Australia). School of Chemical Engineering.
For primary bibliographic entry see Field 5D. W75-03531

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW), National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div. For primary bibliographic entry see Field 5D. W75-03553

3E. Conservation In Industry

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES, Gilbert Associates, Inc., Reading, Pa. For primary bibliographic entry see Field 5G. W75-03397

REGULATORY MANAGEMENT PROGRAMS FOR FLORIDA MARINE FISHERMEN, For primary bibliographic entry see Field 6E. W75-03487

INTERNAL POLLUTION CONTROLS IN THE PULPING INDUSTRY, EKONO, Seattle, Washington. For primary bibliographic entry see Field 5D. W75-03366

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE

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CONTRE LA POLLUTION DES EAUX EN PAPETERIE).

Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany). For primary bibliographic entry see Field 5G. W75-03567

REMOVAL OF ARSENIC FROM EFFLUENT SLUDGES OF SULFATE AND OF PULP AND PRODUCTION (UDALENIE MYSH'YAKA IZ SHLAMOV SERNOKISLOT-NOGO I TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),

For primary bibliographic entry see Field 5D. W75-03568

TREATMENT OF INDUSTRIAL EFFLUENTS **FLOTATION** (TRAITEMENT D'EFFLUENTS INDUSTRIELS PAR FLOTTA-

Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France). For primary bibliographic entry see Field 5D. W75-03569

SLIME CONTROL COMPOSITIONS AND THEIR USE,

Betz Labs., Inc., Trevose, Pa. (assignee) For primary bibliographic entry see Field 5D.

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KAR-TONINDUSTRIE),

Cellulose Attisholz A.G., Solothurn (Switzerland). For primary bibliographic entry see Field 5D.

METAL SALTS OF DITHIOCARBAMIC ACID DERIVATIVES, THEIR MANUFACTURE AND USE (METALLSALZE VON DITHIOCAR-BAMIDSAEURE-DERIVATEN, HERSTELLUNG UND VERSENDUNG), Buckman Labs., Inc., Memphis, Tenn.

For primary bibliographic entry see Field 5D.

PROCESS FOR WASTE WATER PURIFICA-TION (VERFAHREN ZUM REINIGEN VON AB-WASSER)

Casco A.B., Stockholm (Sweden). For primary bibliographic entry see Field 5D. W75-03582

PULPING PROCESS PREVENTS POLLUTION, For primary bibliographic entry see Field 5D. W75-03588

METHOD OF REDUCING THE DISCHARGE OF WASTE PRODUCTS FROM PULP MILLS, Skogsagarnas Industri A.B., Vaxjo (Sweden). For primary bibliographic entry see Field 5D.

SYSTEM FOR RECOVERY OF FIBER FROM PAPER MILL EFFLUENT, INCLUDING SIEVE BEND SCREEN.

Dorr-Oliver, Inc., Stamford, Conn. (assignee) For primary bibliographic entry see Field 5D. W75-03592

BENEFICIATION OF LIGNIN SOLUTIONS AND PULP MILL WASTES, Betz Labs., Inc., Trevose, Pa. (assignee)

For primary bibliographic entry see Field 5D. W75-03593

SLIME CONTROL IN INDUSTRIAL WATERS, Economics Lab., Inc., St. Paul, Minn. (assignee) For primary bibliographic entry see Field 5D.

OF DECOLORIZING PROCESS LIQUID DISCHARGED BY A PAPER

MILL, Owens-Illinois, Inc., Toledo, Ohio. (assignee) For primary bibliographic entry see Field 5D. W75-03595

METHOD OF DECOLORIZING PAPER MILL. EFFLUENT LIQUID, Owens-Illinois, Inc., Toledo, Ohio. (assignee)

For primary bibliographic entry see Field 5D.

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY, Rust Engineering Co., Birmingham, Ala.

For primary bibliographic entry see Field 5D. W75-03598

HYBRID DONNACONA TMR PLANT FEATURES ZERO POLLUTION,

For primary bibliographic entry see Field 5D. W75-03603

POWER GENERATION FROM HOT BRINES. Geothermal Investment Co., Pasadena, Calif.

For primary bibliographic entry see Field 4B. W75-03737

HYDROMETALLURGY, Pennsylvania State Univ., University Park. Metallurgy and Mineral Processing Sections. F. F. Aplan.

Society of Mining Engineering, Vol 26, No 2, p 70-72, February 1974. 32 ref.

Descriptors: *Metallurgy, *Research and development, *Heavy metals, *Separation techniques, Trace metals, Copper, Nickel, Zinc, Gold, Cobalt, Industrial wastes, Sulfur compounds, Recycling. Identifiers: *Hydrometallurgy.

Hydrometallurgy is currently the fastest growing segment of the mining profession. Environmental factors have forced consideration of these processes which might mitigate the SO2 off-gas problem of conventional smelters, but the ever-increasing demand for metals probably plays the greater role. Copper is the most active area of research and many alternative processes to the traditional sulfuric acid-iron sulfate leach have been proposed. Magnetic separation and chemical refining recover pure nickel from the cemented product. The Japanese propose a chlorinationvolatilization process for lateric ores followed by conventional solution chemistry to recover the nickei. Interest in zinc hydrometallurgy has been sparked by two new zinc smelters, both using electrolysis. Recent dramatic increases in the price of gold have sparked renewed interest in gold recovery processes. As far as environmental considerations go, the mining industry has committed much effort to the search for solutions to the smelting problems associated with copper and other ores. Hydrometallurgy has proven to be valuable in this endeavor. (Jernigan-Vanderbilt) RECYCLING MILLING WATER IN MISSOU-

RI'S NEW LEAD BELT, Cominco American, Inc., St. Louis, Mo. For primary bibliographic entry see Field 5D.

3F. Conservation In Agriculture

RELATIONSHIPS RETWEEN MOISTURE AVAILABILITY AND NITROGEN RESPONSE IN WINTER WHEAT, Kansas State Univ., Manhattan, Dept. of Agrono-

R. L. Vanderlip, L. S. Murphy, D. A. Whitney, and C. A. Thompson.

Available from the National Technical Informa-Available from the National Technical Informacian Information Service, Springfield, Va 22161 as PB-238 635, \$3.75 in paper copy, \$2.25 in microfiche. Kansas State University Agricultural Experiment Station, Research Paper 20, April 1974. KWRRI Contribution No 99. 37 p. 9 fig, 10 tab, 40 ref, append. OWRT A-022-KAN(2). 14-01-0001-1635.

Descriptors: *Soil moisture, *Wheat, *Nitrogen, *Rainfall, *Regression analysis, Estimating, *Kansas, Equation, *Forecasting.
Identifiers: *Winter wheat, Seeding rate, Soil

Multiple regression techniques were used to obtain prediction equations relating wheat response to applied nitrogen, soil moisture, rainfall, soil nitrogen content, variety, and seeding rate. Yield variability could be significantly related to these variables in both central and western Kansas. However, coefficients of determination were approximately 0.9 for western Kansas and 0.7 for central Kansas. All variables considered were important in accounting for variability in yields. Crop variables contributed most to prediction followed by moisture and soil nitrogen variables. Applied nitrogen was significantly related to yield; however, it contributed least to the prediction equations. Measured soil moisture at the experimental sites and estimated soil moisture as provided by the Kansas Crop and Livestock Reporting Service each were effective as soil moisture variables as measured by coefficients of determination. How-ever, they did not result in consistent predicted effects of applied nitrogen, spring rainfall or to soil moisture itself. It is anticipated these or similar equations could be used to provide a guide for spring application of nitrogenous fertilizer. W75-03307

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICA-

TIONS ON SOIL, Nebraska Univ., Lincoln. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-03310

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE EN-VIRONMENT (PHASE II), Nebraska Univ., Lincoln. Water Resources

Research Inst.
For primary bibliographic entry see Field 5B.
W75-03315

WATER CONSERVATION IN THREE GRAIN CROPS IN THE ZAMBEZI VALLEY, Department of Agriculture, Lusaka (Zambia).

Department of Agriculture, Lusaka (Zamoia).

O. Honisch.

Exp Agric, Vol 10, No 1, p 1-8, 1974.

Identifiers: Bulrush millet, "Grain crops, Infiltration, Seedbeds, Sorghum, "Zambia(Zambezi Valley), "Water conservation, Com(Field).

The results of a 3-yr water conservation trial in the Zambezi Valley of Zambia are reported, for an area characterized by high temperatures and low,

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often poorly distributed rainfall, with low infiltration and high evapotranspiration rates. As a result of these conditions local farmers often produce grain crops yielding as little as 200-300 kg/ha, though considerable increases could be obtained by simple water conservation methods. Of 4 treatments, tie-ridges made before the start of the 1st rains consistently gave the heaviest yields. Mean yields of the 3 crops under trial (maize, sorghum and bulrush millet) were higher on tie-ridges than on conventionally prepared seedbeds by 168, 159 and 17% in the 1968-69 to 1970-71 seasons, respectively.—Copyright 1974, Biological Abstracts, Inc. W75-03332

PHYSIOLOGICAL ANALYSIS OF RESPONSE OF SORGHUM HYBRIDS 'CSH-1' AND 'CSH-2' TO RAIN-FED CULTIVATION, Indian Agricultural Research Inst., New Delhi.

Div. of Plant Physiology. A. K. Bagga, M. M. Ghare, and R. D. Asana. A. K. Bagga, M. M. Charer, and K. D. Asana. Indian J Agric Sci, Vol 43, No 3, p 225-229, 1973. Identifiers: *Cultivation, Grain, Growth, Hybrids, Moisture, *Physiological analysis, Seasonal, *Sorghum hybrids, Sorghum-bicolor, Temperature, Crop vields.

Hybrid sorghum 'CSH 2' (Sorghum bicolor (L.) Moench) produced higher grain yield than hybrid 'CSH 1' under irrigation, but equal or less yield under rain-fed cultivation. The crop-growth rate, the leaf-area index and the net assimilation rate during the stage of maximum leaf area were similar in both, but 'CSH 2' had a taller stem and higher dry weight than 'CSH 1' at anthesis. 'CSH 2' had consistently higher grain number per panicle, but owing to its late-flowering habit its grain developed much later after the cessation of rains at lower temperatures and under greater moisture stress, with the result that the single-grain weight was sometimes reduced under rain-fed condition. The emergence of panicle was also more ham-pered in rain-fed 'CSH 2.' Thus high grain number and flowering by the end of rainy season would be desirable for rain-fed cultivation.--Copyright 1974, Biological Abstracts, Inc.

UTILITY OF A SIMPLE SOIL WATER BUDGET MODEL IN AGRONOMIC RESEARCH: I. EF-FECTS OF PLANT DENSITY, TIME-OF-SOW-ING AND FALLOW WATER ON AVAILABLE SOIL WATER UNDER SPRING WHEAT, Thai-Australian Colombo Plan Project, Chainat (Thailand).

R. G. Fawcett, and O. G. Carter.

Aust J Exp Agric Anim Husb Vol 13, No 65, p 714-717, 1973.

Identifiers: Agronomic research, Density, *Model studies, *Soil water, Sowing, Spring, Utility, *Water budget, *Wheat, *Australia.

A simple soil water budget model was used to estimate weekly changes in available soil water as af-fected by plant density, time of sowing and level of available fallow water for spring wheat cultivars grown on a black earth in northern New South Wales (Australia). Estimated values of available water were mostly within plus or minus 10 mm of observed values (ranging from 50-270 mm) ob-tained at 4 intervals during the growing season. The results are discussed in relation to both the in-terpretation of agronomic field experiments and use of the model in regions where conserved fallow water contributes significantly to cereal production.—Copyright 1974, Biological Abstracts, Inc. W75-03450

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT), Army Engineer District, St. Louis, Mo. For primary bibliographic entry see Field 4A. W75-03452

PRODUCTIVITY IN DWARF WHEATS IN A SILT-LOAM SOIL AS INFLUENCED BY SOILMOISTURE REGIMES AND NITROGEN FERTILIZATION UNDER SHALLOW WATER
TABLE CONDITIONS,
Govind Ballabh Pant Univ. of Agriculture and

Technology, Pantnagar (India). Dept. of Agrono-

Pyare Lal, and K. C. Sharma. Indian J Agric Sci, Vol 43, No 3, p 255-261, 1973. Identifiers: *Dwarf wheats, *Fertilization, Grain yields, Loam, Nitrogen, *Productivity, Silt, *Soil moisture, Water table, Wheats, *India.

Field experiments were conducted in the winter seasons of 1968-69 and 1969-70 at Pantnagar (India) to study the response of dwarf wheats ('Kalyan Sona' and 'Sonalika') to soil moisture regimes and N fertilization. The different soil moisture regimes (25, 50 and 75% depletion of available moisture) maintained after a common irrigation at crown-root initiation stage had no sig-nificant bearing on the yield, probably because of the shallow water table. Fertilization up to 100 kg N/ha increased the grain yield significantly. The response to N was quadratic in both the varieties. The most profitable levels of fertilization for 'Kalyan Sona' and 'Sonalika' were 133 and 156 kg N/ha in 1968-69 and 152 and 141 kg N/ha in 1969-70. The maximum net profit as a result of N application was higher in 'Kalyan Sona' than in 'Sonalika.'--Copyright 1974, Biological Abstracts, Inc. W75-03557

THE EFFECT OF SHELTER BELTS AND IR-RIGATION ON WATER USE IN A DRY RE-

Norges Landbrukshoegskole, Vollebeck. Dept. of Agricultural Hydrotechnics.

B. Rognerud, and K. Varum Nordic Hydrology, Vol 5, No 3, p 166-172, 1974. 3

Descriptors: *Shelterbelts, *Irrigation, Water balance, *Soil moisture, Evapotranspiration, Ten-Water utilization, On-site investigations, Profiles.

Identifiers: *Norway, Neutron probe.

Results are presented of a water balance investigation on irrigated and non-irrigated plots at Lesja, an extremely arid area of North Gudbrandsdal. Norway. Wooden shelter belts were used across the valley and the prevailing wind direction. These belts were 60 cm high, 8 to 15 m apart, and were used to accumulate snow, prevent wind erosion, and to protect plants against heavy winds. Average yearly precipitation was 300 to 400 mm. Soil moisture measurements were made with neutron probes 8 times, 4 on irrigated and 4 on non-irrigated research plots. On each water treatment 2 profiles were located close to the shelter belts and midway between. The distance between the shelter belts was 8 m. The soil was deep and the water holding capacity high. Values of actual evapotranspiration on all plots were presented. On irrigated fields the evapotranspiration was higher between shelter belts than at the shelter belts. Plant cover was well developed on all irrigated plots. The effect of the shelter belts on yield was about 10% on irrigated plots. The climate in the area is characterized by low humidity and high winds, and this may cause some oasis effect on the water use on the irrigated plots. (Roberts-ISWS) W75-03652

ACTUAL EVAPOTRANSPIRATION IN RELA-

TION TO LEAF AREA,
Royal Veterinary and Agriculture Coll.,
Copenhagen (Denmark). Hydrotechnical Lab.;
and Royal Veterinary and Agriculture Coll.,
Copenhagen (Denmark). Climate Station.
For primary bibliographic entry see Field 2D.

IN SITU MEASUREMENTS OF LEAF WATER POTENTIAL AND RESISTANCE TO WATER FLOW IN CORN, SOYBEAN, AND SUNFLOWER AT SEVERAL TRANSPIRATION RATES, Atmospheric Environment Service, Downsview

(Ontario). H. H. Neumann, G. W. Thurtell, and K. R.

Stevenson. Can J Plant Sci, Vol 54, No 1, p 175-184, 1974. Identifiers: Corn(Field), Flow, Glycine-max, Helianthus-annuus, *Leaf water potential, Measurement, Roots, Soybean, Stalk, Sunflower, *Transpiration, *Hygrometry.

Peltier-cooled thermocouple dewpoint hygrometers were used to measure leaf water potentials at several transpiration rates on intact corn (Zea mays L.), soybean (Glycine max (L.) Merr.), and sunflower (Helianthus annus L.), grown in a controlled environment in silica sand rooting media frequently watered with nutrient solution. Hygrometers were left in position for the duration of measurements on each plant, but tests showed this to have little effect on measured potentials. Measured potentials were linearly related to the transpiration rates (correlation coefficients greater than 0.98). Extrapolated values of leaf water potential at zero transpiration were within a few tenths bar of measured nutrient solution potentials. Plant resistances to water flow remained constant from near zero transpiration up to the maximum obtained average rates of 1.8-3.0 g dm-2 h-1. The magnitude of the resistance varied con-siderably from plant even within a single cultivar of 1 sp. and definite conclusions as to interspecies differences in resistance were not made. Estimates of the relative resistance in the root, stalk, and the leaf that were made for a few plants were similar to previously published results.—Copyright 1974, Biological Abstracts, Inc. W75-03668

MANAGEMENT DISTRICTS WATER NORTH DAKOTA, For primary bibliographic entry see Field 6E. W75-03701

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION, For primary bibliographic entry see Field 5D. W75-03743

THE HYDROLOGY OF A SMALL CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND VEGETATION COVER,

Agricultural Research, Zaria Institute for For primary bibliographic entry see Field 4A. W75-03765

COMPARATIVE STUDY OF SOURCES FOR FERTILISATION OF RAINFED BAJRA, Central Arid Zone Research Inst., Jodhpur (India).

D. L. Vyas, S. D. Singh, H. S. Daulay, and D. K. Misra.

Ann Arid Zone 11(3/4): 145-153, 1972.

Descriptors: *Nitrogen, Plant growth, Asia, *Fertilizers, Agricultural chemicals, Crop response.

Identifiers: *Bajra, India, Pennisetum-typhoides.

Sources of N did not influence the grain and stalk Sources of N did not influence the grain and stalk yields. N-treated plots indicated an increase in yield over the control, but the 3 units of N gave equal yields. The optimum dose of N for the local cultivar R.S.K. was 23.2 kg/ha. Any source of N can be used for bajra (Pennisetum typhoides) cultivation under natural rainfall conditions of the sandy arid plains of Rajasthan, India.—Copyright 1074 Bickelical Abstrates Inc. 1974, Biological Abstracts, Inc.

Field 3—WATER SUPPLY AUGMENTATION AND CONSERVATION

Group 3F-Conservation In Agriculture

W75-03829

PRODUCTION AND UTILIZATION OF FODDER AND GRAIN SORGHUM AS FORAGE FOR CATTLE IN THE ORD RIVER VALLEY, WESTERN AUSTRALIA, Commonwealth Scientific and Industrial Research

Organization, Kununurra (Australia). Div. of Land Research

C. G. Blunt, and M. J. Fisher.

Aust J Exp Agric Anim Husb 13(62): 234-237,

Descriptors: Irrigation effects, *Forage sorghum, Crops, Field crops, Grasses, *Forage grasses, *Australia, *Cattle, *Grain sorghum, Animal growth, Growth rates. Identifiers: Fodder.

Three experiments were carried out to obtain data on optimum water and N regimes for growing fodder sorghum: on cattle liveweight gains on irrigated fodder sorghum and grain sorghum regrowth and on cattle liveweight gains on green chop fodder sorghum in feed lots. Near maximum dry matter yields of fodder sorghum were obtained with 180 kg ha-1 N and 4-weekly irrigation. Fodder sorghum grazed at 6.4 and 4.0 head ha-1 for 26 wk sorgnum grazed at 6.4 and 4.0 head ha-1 for 26 wk gave mean liveweight gains of 0.36 and 0.41 kg head-1 day-1. Ratooned grain sorghum grazed at 4.0 head ha-1 gave 0.35 kg head-1 day-1, but was unable to carry 6.4 head ha-1. Green chop fodder sorghum fed at the preflowering and at the soft dough stages gave mean liveweight gains of 0.48 and 0.37 kg head-1 day-1 over 26 wk.—Copyright 1974 Biolegical Abstracts Inc. 1974, Biological Abstracts, Inc. W75-03830

EFFECT OF ORGANIC MULCHES ON THE HYDROTHERMAL REGIME OF SOIL AND GROWTH OF POTATO CROP IN NORTHERN

Punjab Agricultural Univ., Ludhiana (India). S. S. Grewal, and N. T. Singh. Plant Soil 40(1): 33-47, Illus. 1974.

Descriptors: *Mulching, *Potatoes, Crops, Dicots, Field crops, Vegetable crops, "Plant growth, Asia, *Soil temperature plastics, Irrigation practices. Identifiers: Ethylene, *India, Mulches, Pen-nisetum, Typha, Polyethylene.

Possibilities of manipulating hydrothermal regime of soil with different organic mulches and their ef-fect on the growth of potato crop was studied. Mulches like mat (Typha sp. interwoven into a web) and Pennistum stalks lowered the soil temweb) and Pennistum stalks lowered the soil tem-peratures maxima at a depth of 10 cm by 1.5C dur-ing autumn and by 3.5C during spring as compared with control plots. Polyethylene mulch increased soil temperature maxima by 1.4C and 2.2C during autumn and spring, respectively and minima by 2.4C during both the seasons. This treatment saved 2 and the former treatment 1 irrigation each out of a total of 6 irrigations applied to control plots. During autumn polyethylene gave significantly higher yield as compared with other treatments. During spring, when both polyethylene and coal dust increased soil temperature, yields were low under these treatments and the tubers were malformed with many sprouts. The yield as well as tuber size were governed by minmum soil temperature during autumn but soil temperature maxima in-fluenced both yield and quality in the spring crop. The possibility of manipulating soil temperature in order to improve quality and yield of potato crop under the climatic conditions of North India is pointed out.--Copyright 1974, Biological Abstracts, Inc. W75-03837

LEAF WATER CONTENT AND POTENTIAL IN CORN, SORGHUM, SOYBEAN, AND SUN-

Atmospheric Environment Service, Downsview

H. H. Neumann, G. W. Thurtell, K. R. Stevenson, and C. L. Beadle

Can J Plant Sci 54(1): 185-195, 1974. Can Fraintschaft, 183-193, 1974.
Identifiers: Age, Corn(Field), Glycine-max, Helianthus-annuus, *Leaf water potential, Sorghum, Sorghum-vulgare, Soybean, Sunflower, Wilting, *Hygrometry, Measurement.

The Peltier-cooled thermocouple dewpoint hygrometer technique of in situ measurement of leaf water potential was further developed. The observed response of the instrument agreed so well with theoretical analysis that calibration based on theory was within 1% of that obtained using salt solutions of known water potential. Simultaneous measurements with the hygrometer and a beta gauge were made to derive the leaf water content-potential relationships for several crop plants. Results showed relative water contents dropping only to near 0.95 for mature corn (Zea mays L.); sorghum (Sorghum vulgare Pers.); and sunflower (Helianthus annus L.) leaves, and (L.) Merr.) leaves as potentials declined from near 1 bar to the plant wilting point (-8 to -14 bars). Further decline of leaf water potential resulted in relatively much greater loss of leaf water.—Copyright 1974, Biological Abstracts, Inc. W75-03839

CHANGES IN STEM DIAMETER OF HER-BACEOUS AND WOODY PLANTS AS A MEASURE OF INTERNAL WATER BALANCE, Pahlavi Univ., Shiraz (India). Coll. of Agriculture. For primary bibliographic entry see Field 2I. W75-03840

RESPONSE OF MYCORRHIZAL AND NON-MYCORRHIZAL AND NON-MYCORRHIZAL AND NON-MYCORRHIZAL ROOTED CUTTINGS OF HEATHER (CALLUNA VULGARIS(L.) HULL) TO VARIATIONS IN NUTRIENT AND WATER REGIMES, Stirling Univ. (Scotland). Dept. of Biology.

P. Bannister, and W. M. Norton. New Phytol, Vol 73, No 1, p 81-89, 1974. Identifiers: Calluna-vulgaris, *Dry matter produc-tion, Growth rates, *Heather, *Mycorrhizal

rooted cuttings, Nitrogen, Nutrients, Phosphorus, Potassium, Production, Roots, Fertilization.

Rooted cuttings of heather showed their best dry matter production in drained regimes with a frequent addition of nutrients. Mycorrhizal plants generally showed a decreased production when compared with equivalent non-mycorrhizal plants, except on drained regimes low in nutrients where except on drained regimes low in nutrients where the mycorrhizal plants grew better. Concentra-tions of N in the shoot and K and P in the root were higher in mycorrhizal than in non-mycorr hizal plants, effects most marked in well-drained regimes with the minimum addition of nutrients. In general, alterations in nutrient and water regimes had more significant effects on dry matter production than did the presence or absence of mycorr-hiza. Mycorrhizal infection may have a beneficial effect in freely drained, infertile, soils that are characteristic of well-developed heathland.--Copyright 1974, Biological Abstracts, Inc. W75-03842

DEFOLIATION, LEAF AREA INDEX, AND THE WATER USE OF FOUR TEMPERATE PASTURE SPECIES UNDER IRRIGATED AND DRYLAND CONDITIONS, University of New England, Armidale (Australia).

Dept. of Agronomy

Dept. of Agroundry. G. G. Johns, and A. Lazenby. Aust J Agric Res, Vol 24, No 6, p 783-795, 1973. Identifiers: "Defoliation, Dryland, Festuca-arun-dinacea, Irrigated soils, "Leaf area index, Loliumperenne, Pasture species, Senescence, Transpiration, *Water utilization, *Swards. Phalaris-tuberosa, Trifolium-repens, Measurements were made over a 12-mo. period of the water use and leaf area index (LAI) of, both dryland and irrigated monoculture swards of 4 temperate pasture species (Trifolium repens, Lolium perenne, Festuca arundinacea and Phalaris tuberosa) under 2 defoliation regimes. All 4 species used similar quantities of water on the dryland plots despite large differences in their ability to grow under such conditions. Even though very dry conditions prevailed during part of the study, the dryland swards generally failed to exploit reserves of soil moisture below a depth of about 120 cm. The water use of the irrigated swards was sensitive to the manipulation of LAI by defoliation, while in contrast, dryland water use was not. On the irrigated swards, at an LAI of 1, a 1% decrease in LAI was associated with a 1% decrease in water use. This sensitivity of water use decreased as LAI increased until, at an LAI of 3 and above, water use appeared to be insensitive to charges in LAI. During the late spring to early autumn period both irrigated and dryland water use were significantly related to LAI. In this period, those irrigated and dryland swards which had common values of LAI generally used similar quantities of water. This finding indicated that stomatal control was ineffective in reducing water use per unit of leaf area. The quantity of dead herbage present in the swards suggests that pronounced leaf senescence (and hence reduction of leaf area) may have been a consequence of ineffective stomatal control of transpiration.—Copyright 1974, Biological Abstracts, Inc. W75-03848

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

STATIC PRESSURE FRACTIONATION CHARACTERISTICS OF WATER HYACINTH, Florida Univ., Gainesville. Dept. of Agricultural

Engineering.

L. O. Bagnall, and F. J. Corral.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 669, \$3.25 in paper copy, \$2.25 in microfiche. Paper No 74-5007, presented before the American Society of Agricultural Engineers, Stillwater, Oklahoma, June 23-26, 1974. 20 p, 10 fig, 5 tab, 13 ref. OWRR A-017-FLA(7). 14-31-0001-3809.

Descriptors: *Drying, Chemical analysis, Nutrients, Digestion, *Aquatic weeds, *Water hyacinth, *Rooted aquatic plants, Animal physiology, Toxins, Feeds.

Up to 82% of the water hyacinth was removed from prepared plants by multiple pressings in a screen-lined cylinder with a low speed press. Plants as wet as 2089% dry basis moisture content were pressed to as low as 404% dry basis moisture content using pressures as low as 45 psi. A maximum of 0.35 horsepower-hour was required to remove a ton of water in single or multiple pressings. Water expression increased with increasing pressure, dwell time under pressure, pressure rise time and screen open area. Energy increased with increasing pressure and screen open area and decreased as rise time increased. Mincing increased expression and decreased energy requirement and cake moisture content. Chopped plants did not press satisfactorily without additional reduction; this reduction can be combined with the pressing process in devices such as screw presses. Regressions relating relevant expressions, moistures and energies to selected pressing variables were developed. (Morgan-Florida) W75-03302

WATER QUANTITY MANAGEMENT AND CONTROL—Field 4

Control Of Water On The Surface—Group 4A

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS. Nebraska Univ., Lincoln.

For primary bibliographic entry see Field 5B. W75-03311

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM.

Iowa State Water Resources Research Inst., Ames; and Iowa State Univ., Ames. Engineering Research Inst. For primary bibliographic entry see Field 6G.

PREDICTING THE FLOW OF WATER WITHIN

REDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL, Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering. For primary bibliographic entry see Field 8B. W75-03320

AQUATIC WEED HARVESTING COSTS AND EQUIPMENT-1972, Aquamarine Corp., Waukesha, Wis. C. B. Bryant.

Hyacinth Control Journal, Vol 12, p 53-55, May 1974. 3 tab, 2 ref.

W75-03318

Descriptors: *Harvesting, *Costs, Aquatic plants, *Aquatic weed control, Equipment, Machinery, Water pollution control, *Cost comparisons, Estimating, Labor.

Not until the mid-20th century have machines for harvesting aquatic weeds become commercially available. The design of the equipment has been generally uniform: a powered barge equipped with mounted underwater cutters in front of an inclined porous conveyor and a holding area for the harvested weeds, and a handling and/or transporta-tion system to shore and trucks. Costs of harvesting depend on the equipment used and the location harvested. Results of a cost-and-performance questionnaire prepared for harvesting operations put into service after 1970 in six locations are sum-marized. Information requested for the 1971 har-vesting season included acres harvested, tonnage harvested, transportation distances (both land and water), equipment used, movements between lakes, maintenance down time, type of weed harvested, and use of harvested weeds. Labor cost/ton varied significantly in the six locations surveyed, from \$0.60 to \$10.42, and labor costs/acre ranged from \$10.00 to \$28.18. Cost variations were traced to weed type, infestation density, transportation distance, and disposal requirements, as well as equipment. All but one location surveyed utilized Aquamarine equipment from which cost estimates were derived. (Schroeder-Wisconsin) W75-03391

GREAT LAKES-ST. LAWRENCE SEAWAY SYSTEM AND THE MID-CONTINENT ECONO-

MY, Great Lakes Basin Commission, Ann Arbor, Mich.

For primary bibliographic entry see Field 6B. W75-03394

PROPOSED NATURAL AREAS, SALT RIVER SALT BANKS, REPORT NO 2, Arizona Academy of Science, Tempe. For primary bibliographic entry see Field 6B.

TACNA MARSH. NATURAL AREA REPORT

NO. 35, Arizona Academy of Science, Tempe. For primary bibliographic entry see Field 6B. W75-03400

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ÉCOLOGICAL STUDIES.

Atomic Energy Commission, Washington, D.C. For primary bibliographic entry see Field 5C. W75-03401

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-FIFTH ANNUAL REPORT, YEAR ENDED 30TH JUNE

Metropolitan Water Sewage and Drainage Board, Sydney (Australia). For primary bibliographic entry see Field 5G.

W75-03432

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-SECOND ANNUAL REPORT YEAR ENDED JUNE 1970.

Metropolitan Water, Sewage and Drainage Board, Sydney (Australia). For primary bibliographic entry see Field 5G.

W75-03433

EAST BRIMFIELD AND WESTVILLE RESER-VOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVER-MASSACHUSETTS.

Public Health Service, New York. For primary bibliographic entry see Field 6D. W75-03437

RAPID CREEK FLOOD HAZARD ANALYSES-(INCLUDING INMAN CREEK AND WEST FORK CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO.

Soil Conservation Service, Boise, Idaho. June 1974. 22 p, 26 fig, 2 append.

Descriptors: *Flood plain zoning, Flood plains, Floods, *Watershed management, *Flood data, *Flood control, *Flood profiles, *Idaho, Flood forecasting, Flood damage, Flood plain insurance, Flood peak, Flood proofing, Water management, Water policy, Runoff, Snowmelt, Rural areas, Community development, Land use, Storm runoff, Regulations, Legal aspects.

Identifiers: Bannock Co.(Idaho), Rapid Creek(Idaho), Soil Conservation Service, Ordinances, Subdivision regulations, Flood plain management, Inman Creek(Idaho), West Fork Creek Tributaries(Idaho).

Increased flood damages to rural residences in Bannock County, Idaho, from Rapid Creek prompted a need to recognize and evaluate flooding risks. This study identifies flood hazard areas and provides a basis for further study and action to prevent or minimize flood damages. Convective thunderstorms produced from rising and cooling of moist air masses are the major cause of flooding; with runoff from winter storms and snowmelt as a secondary cause. Stream channel profiles, valley cross sections, aerial photos, and maps by the U.S. Geological Survey are included. Recom-mendations include that agriculture can continue to make effective use of the flood plain, flood insurance is needed, buildings must be protected by dikes and flood proofing, and dikes and levees must be constructed. A regulatory approach combining the use of flood lines or floodway zoning regulations to restrict types of development in high hazard areas is needed, together with zoning standards, building codes, or sanitary codes requiring minimum building protection elevations for uses in low hazard areas. In rural lands where floodplain zoning is not immediately possible, stringent sani-tary codes and subdivision regulations could prohibit development in flood-prone lands. (Grden-North Carolina)

FLOOD HAZARD ANALYSES - CITY OF LISBON, RANSOM COUNTY, NORTH COUNTY, DAKOTA.

Soil Conservation Service, Bismarck, N. Dak. Prepared in cooperation with City of Lisbon and the North Dakota State Water Commission, July 1974. 27 p, 21 fig, 2 tab, 10 plates.

Descriptors: Flood plains, Floods, *Watershed management, *Flood protection, *Flood control, Flood forecasting, Channel improvement, Dams, Flood recurrence interval, Floodproofing, Floodways, Levees, Flood plain insurance, Flow con-trol, Warning systems, Insurance, Flood peak, Planning, Management, City planning, Historic floods, Floodwater, Runoff, Channels, *North Dakota.

Identifiers: *Flood plain management, Sheyenne River(ND), Lisbon(ND), Ransom County(ND), Flood plain regulation, Flood control measures.

Flood hazards in Lisbon, North Dakota, are identified to implement a local flood plain management program since flooding due to spring snowmelt runoff occurs in Lisbon about once every 10 years. Included are aerial photomosaic maps, high water profiles, and typical valley cross sections indicating the extent of flooding which can occur from the Sheyenne River which has a total drainage area of about 8,190 square miles above trialmage area of about 5,700 square miles as noncontributing. With 1,440 acres within the corporate limits, a 50-year frequency flood will inundate approximately 325 acres (22 per cent of the city); a 100-year flood will inundate approximately 453 acres (31 per cent of the city); and a 500-year flood will inundate approximately 558 acres (39 per cent of the city). An elevation-frequency curve is also developed for the river at the Burlington Northern Railroad crossing which is typical of the river within the city. Recommendations to solve local flooding problems and develop a flood plain management program include installation of dikes and levees, adoption of local land use and zoning regulations for flood plain areas, flood proofing for existing and future buildings, application to the Federal Insurance Administration for flood plain insurance, installation of a flood warning system and use of flood plain areas for city parks and other open space uses. This technical information can aid in overall community planning and can be coor-dinated with the need to temporarily store and convey floodwaters. (Grden-North Carolina) W75-03439

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. CONSTRUCTION SITE SELEC-

TION, Hawaii Univ., Honolulu. For primary bibliographic entry see Field 8A. W75-03443

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT).

Army Engineer District, St. Louis, Mo. Armiy Engineer District, 20. Louis, Mo. Available from the National Technical Information Service, Dept. of Commerce, Springfield, Va 22161 as EIS-IL-73-1259-F, \$4.00 in paper copy, \$2.25 in microfiche. September 1972. 32 p, 1 map, 3 tab, 7 append.

Descriptors: *Illinois, *Flow augmentation, *Drainage systems, *Pumping plants, Engineering structures, River, Budget, Cost-benefit analysis, Economic justification, Financing, Project planning, Direct benefits, Direct costs, Government finance, Federal government, Land resources, Social aspects, Wildlife conservation, Water resources development, Runoff, Levees, Seepage, Flood protection, Flood damages, Administration, Drainage, Crop production, Arable land, Agricultural engineering. Identifiers: *Environmental Impact Statements, Administrative regulations, *Monroe County(Ill).

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4A-Control Of Water On The Surface

The estimated cost of construction of two pumping stations and appurtenant facilities on the Mississippi River in Illinois, is over \$2,000,000. The project will provide flood protection to 9,000 rural acres. Even though the problem of direct flooding from the river has been largely eliminated by the levee system, there is still a problem with removing runoff and seepage. Substantial flood damage occurs when the gravity drainage system is blocked by high Mississippi River stages. In choosing the project design, economic factors were the primary consideration. Pumping and ditch capacities which provided the greatest excess of average annual benefits over annual costs were used. The project, when completed, will meet 1980 water resource needs. It will also make available increased land for urban, crop, and timber uses. The construction of the project will also provide employment and other economic benefits to the area. Local interests will provide without cost, all lands and easements necessary for the project. The project will have no adverse effect on water quality or wildlife populations of the area. (Sperling-Florida) W75-03452

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 5 WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72, Economic Research Service, Washington, D.C. National Resource Economics Div. For primary bibliographic entry see Field 4D. W75-03483

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING, For primary bibliographic entry see Field 6B. W75-03525

FITTING A THREE-PARAMETER LOG-NOR-MAL DISTRIBUTION BY LEAST SQUARES, Environmental Protection Agency, Athens, Ga. Southeast Water Lab. For primary bibliographic entry see Field 2E. W75-03651

RAINFALL INTERCEPTION IN A FOREST IN THE VELEN HYDROLOGICAL REPRESENTA-TIVE BASIN, Swedish Meteorological and Hydrological Inst.,

For primary bibliographic entry see Field 2I. W75-03654 Stockholm.

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SE-RIES,

Pittsburgh Univ., Pa. Dept. of Civil Engineering. For primary bibliographic entry see Field 2E.

COMPENSATORY STORAGE, For primary bibliographic entry see Field 6E. W75-03676

REGULATION OF GREAT LAKES WATER LEVELS-APPENDIX G-REGULATORY
WORKS-REPORT TO THE INTERNATIONAL
JOINT COMMISSION.

International Joint Commission-United States and Canada. Great Lakes Levels Board. Available from International Joint Commission, through Detroit District Corps of Engineers, PO Box 1027, Detroit, Mich. December 7, 1973. 213 p,

34 tab, 84 fig, 3 annex.

Descriptors: *Great Lakes, *Water level fluctua-tions, *International Joint Commission, *Engineering structures, *Evaluation, Lakes,

Lakes region, Water levels. Discharge(Water), Regulated flow, Regulation, Water management(Applied), Comprehensive planning, Planning, Water policy, Water resources development, Structures, Economic feasibility, Environmental effects, Cost-benefit analysis, Governmental interrelations, United States,

Identifiers: *Environmental policy, *State policy, *Effluent limitations, *International agreements,

Engineering works are described which would be necessary to accomplish further regulation of the levels and flows of the Great Lakes, as described in the report on Regulation of Great Lakes Water In the report on Regulation of Great Lakes water Levels, dated December 7, 1973. Existing facilities for Lake Superior and Lake Ontario are described and the problems to be faced in providing new facilities, particularly in the outlet rivers of the presently unregulated Lakes Michigan, Huron, and Erie are discussed. Also described are the site investigations carried out, the design criteria and methods used, and the environmental factors considered in the preparation of preliminary designs and cost estimates of the works necessary for the various regulation plans considered in the Board's study. All necessary construction would be economically feasible, with the exception of work necessary to regulate the level of Lakes Michigan-Huron. The cost of required construction in the St. Clair-Detroit Rivers system far exceeds the estimated economic benefits of such regulation. (Deckert-Florida) W75-03682

ALTERING ALABAMA'S HISTORY. Soil Conservation Service, Auburn, Ala. W. B. Lingle.

Soil Conservation, p 4-5, December 1973. 2 illus.

Descriptors: *Alabama, *Legislation, *Water Descriptors: "Alabama, "Legislation, "Water supply, "Watershed management, "Reservoirs, Water policy, Siltation, Floods, Flood plains, Flood protection, Conservation, Recreation, En-vironment, Environmental effects, Impound-ments, Impounded waters, Water manage-reant/Apriled, Flood control. ment(Applied), Flood control.

In Alabama, projects to help reduce flooding and conserve resources are having a beneficial effect on the state. The Watershed Protection and Flood Prevention Act is inducing people to use flood-prone areas not only by protecting them from floods but also by offering opportunities for community growth and improvement. The city of Heflin is moving to take full advantage of its 84acre multi-purpose watershed lake to attract new industry. In Randolph County, High Pine Creek was previously clogged with silt and debris. The creek flooded three to five times every year. People were leaving Roanoke and the surrounding area in droves. Sedimentation of Roanoke's water supply reservoir had reduced its capacity by onethird in seven years. Water rationing was normal during dry seasons. Today, 209 surface-acres of water are stored in nine flood detention reservoirs. The Choccolocco Creek Watershed Project near Anniston is another example of multiple-use of floodwater retarding structures. Multipurpose structures will provide recreation areas in Talladega National Forest and in the Cypress Creek watershed. These watershed projects offer many ways to improve both the environment and the economy of Alabama. (Ritchie-Florida) W75-03688

MANAGEMENT DISTRICTS IN NORTH DAKOTA,
For primary bibliographic entry see Field 6E.
W75-03701

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IN-PACT STATEMENT).
Army Engineer District, San Francisco, Calif.

November 28, 1973. 60 p, 8 fig.

Descriptors: *Environmental effects, *Dredging, *Jetties, *Harbors, *California, In-lets(Waterways), Channel improvement, Spoil tets(waterways), Channel improvement, Spot banks, Federal government, Bays, Rivers and Harbors Act, Breakwaters, Coastal engineering, Coasts, Coastal structures, Navigation, Disposal, Water quality, Benthic flora, Benthic fauna, Aquatic environment, Aquatic habitats, Oceans, Administrative agencies, Pacific Ocean, Water Administrative agencies, Pacific Ocean, Water resources development.
Identifiers: *Environmental Impact Statements,
*Humboldt Bay(Calif), *Coastal waters, *Offshore spoil disposal.

The project involves the rehabilitation and maintenance of rubble-mound jetties at the entrance to Humboldt Bay and maintenance dredging of the five channels in Humboldt Harbor and Bay, located on the northern coast of California. The dredge spoil is deposited offshore at a deep water disposal site approximately one mile from the en-trance to the bay. Formerly a land locked harbor, the bay is quite shallow and continuous dredging is required to maintain the channels for navigation. Rehabilitation of the jetties has already been completed with no significant environmental effects. The dredging operation results in romoval of approximately 600,000 cubic yards of material annually, displacing immobile benthic organisms and causing temporary increases in turbidity in the bay and at the disposal site. The present site has been used for many years with no discernible change. The alternative of no action was not feasible due to the need to maintain the channels in order to allow continued operation of the harbor. While there is no significant opposition to the project, some concern has been expressed over the unknown effects of offshore spoil disposal. (Deckert-Florida)

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS. North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air

W75-03706

Resources

Water and Air Quality Control Committees, Board of Water and Air Resources, June 1, 1974. 185 p, 13 tab.

Descriptors: *North Carolina, *River regulation, *Water quality standards, *Classifications, Descriptors: *North Carolina, *River regulation, *Water quality standards, *Classifications, *Administrative agencies, Water law, Water policy, Water conservation, Water pollution, Water pollution control, Pollution abatement, Water quality control, Water utilization, Legislation, Water resources development, Regulation, Administration, River basins, River systems, Rivers, Streems, Tributories, Legislacote, Environment Streams, Tributaries, Legal aspects, Environmental effects, Decision making, Urban runoff.
Identifiers: Environmental policy, State policy, Administrative regulation.

Presented are copies of all written materials and a record of all comments and discussions presented during the public hearing on the proposed upgrading of classifications of certain waters in the Lumber, Neuse, and White Oak River Basins, and the lower sections of the Cape Fear River Basin.
The hearing was conducted by the Water and Air
Quality Control Committee of the North Carolina Board of Water and Air Resources. Comments were received from various representatives of federal, state and local government and private industry, as well as private citizens and environmental groups. There was considerable controversy over several of the reclassification proposals due to possible adverse effects upon local agricultural and industrial activities. It was also contended that certain streams would be unable to meet the higher water quality standards imposed by the upgrade due to urban runoff. Included are the specific

WATER QUANTITY MANAGEMENT AND CONTROL-Field 4

Groundwater Management—Group 4B

reclassification proposals, and sections of the Laws of North Carolina pertaining to state policy concerning its water resources and the assignment of classifications to surface waters. (Deckert-Florida) W75-03717

BEACH-PROTECTORS,

For primary bibliographic entry see Field 2J. W75-03748

REINFORCED MATTRESS FOR PROTECTING SHORELINES AND THE LIKE, For primary bibliographic entry see Field 2J.

W75-03749

THE HYDROLOGY OF SMALL A CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND

VEGETATION COVER, Institute for Agricultural Research, Zaria (Nigeria).

Samaru Res Bull 149. 120-133, Illus. 1972.

*Watersheds(Basins). Descriptors: Runoff. Agricultural runoff, *Surface runoff, *Runoff forecasting, Runoff coefficient, *Land management, *Vegetation. Identifiers: *Nigeria(Samaru).

Results are given of a long-term field experiment designed to supplement water budget studies of a small catchment basin at Samaru, Nigeria, through assessment of surface run-off under varied land management practices and vegetation covers. The total annual run-off from cultivated land was considerably higher than that occurring in the catchment basin and ranged from 2.9 - 15.5 in. (74-394 mm) a year. Under natural vegetation the runoff was negligible and occurred only on 4 occasions during the 5 yr of the experiment. The highest run-off occurred from cropped land on 3-ft (0.9-m) ridges and from flat bare fallow, averaging 10.4 and 11.7 in (264 mm and 297 mm)/vr respectively. The lowest amount with an average of 5.5 in (140 mm)/yr occurred from cropped land with alternate tied ridges. Cropped flat land and ridged broadlands with alternate tied furrows yielded moderate run-off, averaging 8.5 in (216 mm)/yr. Data on rainfall characteristics are given and their relation with run-off is discussed.--Copyright 1974, Biological Abstracts, Inc. W75-03765

ESTIMATING SOIL WATER CONTENT ON NA-TIVE RANGELAND,

Department of Agriculture, Sidney, Mont. For primary bibliographic entry see Field 2G. W75-03800

CLIO NODS: ARIZONA V. CALIFORNIA AND THE BOULDER CANYON ACT - A REASSESS-

California Univ., Los Angeles. Dept. of History. For primary bibliographic entry see Field 6E. W75-03801

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD

Indian Agricultural Research Inst., Nagpur. All India Soil Land Use Survey. For primary bibliographic entry see Field 4D. W75-03835

4B. Groundwater Management

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE EN-VIRONMENT (PHASE II), Nebraska Univ., Lincoln. Water Resources

For primary bibliographic entry see Field 5B. W75-03315 Research Inst.

SELECTED PHYSICOCHEMICAL PROPER-TIES OF BASALTIC ROCKS, LIQUIDS, AND

Los Alamos Scientific Lab., N. Mex. For primary bibliographic entry see Field 8H.

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES, Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS, Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03422

CONTAINMENT MECHANISMS AND THEIR CONSEQUENCES AT A RADIOACTIVE WASTE REPOSITORY IN BEDDED SALT IN NEW MEXICO, Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 5B. W75-03425

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY

California Univ., Livermore. Lawrence Livermore Lab.

For primary bibliographic entry see Field 5B. W75-03428

A GEOLOGICAL AND SEISMOLOGICAL IN-VESTIGATION OF THE LAWRENCE LIVER-MORE LABORATORY SITE,

California Univ., Livermore, Lawrence Livermore Lab. For primary bibliographic entry see Field 5B. W75-03429

PROPOSED LEGISLATION FOR ARTIFICIAL

GROUNDWATER RECHARGE, Florida Univ., Gainesville. Coll. of Law. F. L. Gillette, Jr.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-230 089, \$5.75 in paper copy, \$2.25 in microfiche. Environ-mental Protection Agency Report, July 1972. 110 p, 185 ref, append.

Descriptors: *Artificial recharge, *Legislation, *Groundwater, *Water reuse, *Water resources, Water resources development, Water supply, Rehabilitation, Water treatment, Legal aspects, Reclaimed water, Waste water(Pollution), Water quality control, Regulation, Adoption of practices, Environmental effects, Environmental sanitation, Administration, Water policy, Florida, Water supply development, Water management(Applied).

Identifiers: Administrative regulations, State pol-

Much research has been conducted in the area of artificial groundwater recharge. The present scientific emphasis is placed on the total systems ap-proach of recycling and reclaiming as much waste production as possible, especially water resources. Suggested legislation is presented, which is general in nature with details to be worked out by regulation. This article is divided into four parts: technological considerations, legal considerations. present legislation, and proposed legislation. Part one evaluates the technological complexities involved and lays the foundation on which the proposed legislation is predicated. Part two elaborates the legal problems involved and stresses the various possible liabilities incurred by anyone who attempts to use the process of artificial groundwater recharge. Parts three and four review current and proposed legislation. (Sperling-Florida) W75-03489

GROUND-WATER QUALITY STUDY, Colorado State Univ., Fort Collins. For primary bibliographic entry see Field 5B. W75-03534

WATER: SIGNIFICANCE AND CHARACTERISTICS, HYDROCARBON DISPERSION IN GROUND

Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management. For primary bibliographic entry see Field 5B.

W75-03662

GROUNDWATER USE ACT OF 1972. For primary bibliographic entry see Field 6E.

POWER GENERATION FROM HOT BRINES. Geothermal Investment Co., Pasadena, Calif. (assignee)

A. J. L. Hutchinson

US Patent No 3,845,627, 6 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 54, November 5, 1974.

Descriptors: *Patents, *Heat flow, *Heat exchangers, *Heat transfer, *Groundwater, Specific gravity, Vapor pressure, Salts, Minerals, Steam, Oily water.
Identifiers: *Power generation, Power sources, *Geothermal wells, *Geothermal heat, Fluids, Gas

expansion.

Hot fluid which may contain salts and other dissolved minerals is passed through a direct contact heat exchanger in heat exchange relationship with a heating fluid that has a specific gravity suffi-ciently below the specific gravity of the hot fluid that it may pass from the bottom to the top of the heat exchanger chamber in contact with the hot fluid. The pressure of the chamber is maintained above the vapor pressure of the hot fluid at the entering temperature of the fluid. The heat transfer fluid is selected so that the salts and other minerals in the fluid are insoluble in the heated heat transfer fluid. The heated heat transfer fluid is passed in heat exchange relationship with a working fluid neat exchange relationship with a working fluid that is vaporized in the heat exchangers and is subsequently passed through a power extracting gas expansion device. Alternatively, an oily substance is added to the hot fluid which may contain salts and other dissolved minerals, and the composition is passed through one or more surface contact heat exchangers for heating a working fluid. The oily substance coats the surface of the exchangers to prevent any mineral deposition. (Sinha-OEIS) W75-03737

RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS,

Sun Research and Development Co., Philadelphia, For primary bibliographic entry see Field 5D. W75-03750

Field 4-WATER QUANTITY MANAGEMENT AND CONTROL

Group 4C - Effects On Water Of Man's Non-Water Activities

4C. Effects On Water Of Man's Non-Water Activities

LINNATURAL SHORELINE. California State Univ., San Francisco. Dept. of

For primary bibliographic entry see Field 5G. W75-03459

WATER: ITS QUALITY OFTEN DEPENDS ON

THE FORESTER,
Food and Agriculture Organization of the United Nations, Rome (Italy). For primary bibliographic entry see Field 5B.

GROUND-WATER QUALITY MODELING,

New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology. For primary bibliographic entry see Field 5B. W75-03661

WATERSHED BEHAVIOR AFTER FOREST

FIRE IN WASHINGTON,
Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment

I. D. Helvey.

Available from Pacific Northwest Forest and Range Experiment Station, PO Box 3141, Portland, Oregon 97208. In: Proceedings of the Irrigation and Drainage Division Specialty Conference, Fort Collins, Colorado, April 22-24, 1973, p 403-

Descriptors: *Forest fires, *Washington, Water temperature, Precipitation(Atmospheric), *Forest watersheds, Burming, *Water yield, Debris avalanches, Vegetation, Watersheds(Basins), Measurement, Evapotranspiration. Identifiers: Wildfire, Debris torrents

More than 120,000 acres of forested land in North-Central Washington were burned in 1970, including the 4,620-acre Entiat Experimental Forest where hydrologic measurements began in 1961. Water yield increased 50% the first year after the fire because of reduced evapotranspiration losses. Stream temperature increased by as much as 10F. Record precipitation amounts, combined with minimal vegetative cover during the second postfire year, triggered debris torrents which destroyed two stream gaging stations, but 27 inches of runoff were measured at the gaging station which survived. This was 360% of maximum annual runoff during calibration and 260% of yield during the previous year. (Forest Service) W75-03820

FIRT YEAR VEGETATION AFTER FIRE, RESEEDING, AND FERTILIZATION ON THE ENTIAT EXPERIMENTAL FOREST, Forest Service (USDA), Wenatchee, Wash.

Pacific Northwest Forest and Range Experiment Station.

For primary bibliographic entry see Field 4D. W75-03823

4D. Watershed Protection

HYDROLOGIC SIMULATION OF A COMPLEX

Washington State Univ., Pullman. Coll. of Engineering.
For primary bibliographic entry see Field 2A. W75-03325

WATERSHED **OPPORTUNITIES** MANAGEMENT IN WYOMING, Wyoming Univ., Laramie. W

search Inst. P. A. Rechard.

In: Proceedings of the Irrigation and Drainage Division Speciality Conference, Fort Collins, Colorado, April 22-24, 1974, p 423-448. 9 fig, 21 ref. OWRT B-021-WYO(1).

Descriptors: *Wyoming, Water vapor, Precipita-tion(Atmospheric), *Rainfall-runoff relationships, Weather modification, *Watershed management, yield improvement, Water *Alternative water use, Management.

On an average day about 5 million acre-feet of water pass over the State of Wyoming in the form of water vapor. This amounts to almost 2 billion acre-feet per year. Of this quantity, approximately 80 million acre-feet fall on the state as precipita-tion during an average year, and about 15 million acre-feet run off in the streams and rivers. Proportionately, these figures indicate that only 4 percent of the precipitable water in the atmosphere above Wyoming falls as precipitation and of that, about 20 percent becomes streamflow. Rough as these figures are, they indicate that there are sizable quantities of water which might be convertet to supply by various techniques. The Wyoming Water Planning Program (1971) recognizes several viable alternatives for water supply development. Among those identified are: weather modification, which attempts to improve the efficiency of the precipitation processes, and watershed manage-ment techniques, which attempt to increase the amount of water made available to beneficial uses after precipitation occurs. Presented are some approximate quantities of water supply that might be made available in Wyoming under some selected watershed management practices.

STUDY AND SURVEY OF LAKE MICHIGAN

For primary bibliographic entry see Field 6E. W75-03357

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 566-WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72,

Economic Research Service, Washington, D.C. National Resource Economics Div. D. M. Lea, and C. D. Mattson.

Agricultural Economic Report No 262, June 1974. 58 p, 9 fig, 28 tab, append.

Descriptors: *Watershed Protection and Flood Prevention Act, *Evaluation, *Federal govern-ment, *Watershed management, *Small watersheds, Flood protection, ment, *Watershed management, *Small watersheds, Drainage projects, Local governments, Governmental interrelations, Water resources development, Irrigation, Recreation, Water policy, Water management(Applied), Administration, Non-structural alternatives, Water supply development, Industrial water, Municipal water, Wildlife, Management, Water supply, Governmental interrelations. Identifiers: *Environmental policy, Administrative regulations.

The operation of the Small Watershed Program which provides federal technical and financial assistance for water management to local organizations is evaluated. From 1954 through 1972. the scope of the watershed program has expanded considerably, but flood protection for farm land remains its most significant feature. Congressional action during this time has expanded the program to include development of recreation, fish and wildlife resources, and municipal and industrial water supply. However, the watershed program has remained predominantly agricultural, with predominantly agricultural,

drainage and irrigation, as well as flood protection, comprising the most significant part of the pro-gram. Changes in the Small Watershed Program since its inception are identified and its varied emphases among different regions of the United States are measured. (Deckert-Florida) W75-03483

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PRO-GRAM--PROPOSED WATER MANAGEMENT GUIDELINES. QUALITY

Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 5G. W75-03491

SURVEY OF EROSION AND LAND USE WITHIN THE CATCHMENT AREA OF KEEPIT DAM (AUSTRALIA): PART 1 - CLIMATE, GEOLOGY, SOILS, Soil Conservation Service of New South Wales,

Sydney (Australia).

Journal of the Soil Conservation Service of New South Wales, Volume 30, No 4, p 229-245, October 1974. 3 fig, 5 tab, 11 ref.

*Erosion, Descriptors: *Watersheds(Basins), *Australia, Sedimentation, *Reservoir silting, Soil surveys, Soil types, Rainfall disposition, Climatic data, Geological surveys, Geomorphology, Reservoirs, Silting, Silts. Identifiers: *Keepit Dam(NSW), Namoi River(NSW).

Siltation of Keepit Dam, designed to regulate the annual discharge of water in the Namoi River, New South Wales, and of the watercourses within the catchment area, poses a threat to the economic viability of the Dam. A survey of erosion within the area was carried out in 1970-71 to allow for selection of sites for soil conservation treatment. The survey is discussed in terms of two physiographic regions of the catchment: a gently undulating area (Northern Tablelands) and an area of steeper, folded terrain (North Western Slopes). Detailed comparisons are provided of the climate, geology and soils of the two regions in relation to erosion hazard. The North Western Slopes, in particular, are characterized by gentle slopes rising abruptly to high ridges, the occurrence of high intensity storms during critical periods, and erodible soils. (Levick-CSIRO) W75-03530

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. I. WATER YIELD RESPONSE AND EFFECTS ON OTHER RESOURCES, Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. For primary bibliographic entry see Field 3B. W75-03572

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS, Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. For primary bibliographic entry see Field 3B.

HYDROLOGY OF CATCHMENT BASIN AT SAMARU, NIGERIA: III. ASSESSMENT OF SURFACE RUN-OFF UNDER VARIED LAND MANAGEMENT AND VEGETATION COVER, Institute for Agricultural Research, Zaria

(Nigeria). or primary bibliographic entry see Field 4A.

W75-03765

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Identification Of Pollutants—Group 5A

WATERSHED BEHAVIOR AFTER FOREST

FIRE IN WASHINGTON,
Forest Service (USDA), Wenatchee, Wash.
Pacific Northwest Forest and Range Experiment

For primary bibliographic entry see Field 4C.

STREAM CHEMISTRY FOLLOWING A FOREST FIRE AND UREA FERTILIZATION IN

NORTH-CENTRAL WASHINGTON,
Forest Service (USDA), Wenatchee, Wash.
Pacific Northwest Forest and Range Experiment

For primary bibliographic entry see Field 2K.

FIRT YEAR VEGETATION AFTER FIRE, RESEEDING, AND FERTILIZATION ON THE ENTIAT EXPERIMENTAL FOREST,

Forest Service (USDA), Wenatchee, Wash. Pacific Northwest Forest and Range Experiment

A. R. Tiedemann, and G. O. Klock.

A. R. Flederman, and G. D. Ricks. Available from Library Pacific Northwest Forest and Range Expt. Sta., Box 3141, Portland, Ore. 97208. U.S.D.A. Forest Service Research Note PNW-195, March 1973. 5 fig, 3 tab, 17 ref. PNW

Descriptors: *Revegetation, regrowth, *Erosion control, *Forest fires, *Fertilization, Nitrogen, Sulfur, Orchardgrass, Fescues, Timothy, Perennial rye grass, Clovers, *Washington *Washington. Identifiers: Entiat Experiment Forest(Wash).

To determine regrowth of native species and the success of erosion control seeding and fertilization, vegetative cover measurements were made on permanent belt transects during 1971 on four watersheds severely and uniformly burned in 1970 that received the following treatments: seeded and fertilized with 57 kilograms per hectare of nitrogen as ammonium sulfate; seeded and fertilized with as aminonium suntate; seeded and termized winds \$4 kilograms per hectare of nitrogen as urea; seeded only; and control (no seeding, no fertil-izer). Erosion control seeding improved first-year vegetative cover by up to one-third. Of the seeded species, orchard grass, hard fescue, and timothy provided most of the first-year cover. Perennial rye and yellow sweetclover showed poor development. Fertilizer did not increase vegetative cover but did improve vigor of seeded species. (Forest Service) W75-03823

ECOLOGY OF RIVER NARMADA UPPER CATCHMENT AREA IN CENTRAL INDIA: I. INTRODUCTION, SITUATION, TERRAIN, LITHOLOGY, CLIMATE, GENERAL FORESTS AND METHODS OF VEGETATIONAL ANALY-

Saurashtra Univ., Rajkot (India). Dept. of

S. C. Pandeya, S. M. Pandya, and M. S. Murthy. S. C. Pandeya, S. M. Pandya, and M. S. Murthy. J Indian Bot Soc. Vol 51, No 3/4, p 356-373, 1972. Identifiers: *Catchments, Climates, Coefficients, *Ecology, Forests, Growth, *India(River Narmada), Lithology, Methods, Phytosociology, Rivers, Statistics, Terrain, *Vegetational analysis.

A systematic ecological survey of the native vegetation of the River Narmada Upper Catchment Area was executed in 4 phases for flood control and soil conservation. The 1st phase consisted of ecological survey of only the forest vegetation in the area. It deals with the situation, vegetation in the area. It deals with the situation, terrain, lithology, climate, general vegetation and methods of vegetational analysis. Vegetation was analyzed for phytosociological characters by quantitative methods and in total 22 associations were arrived at by an objective method of statistical computation of coefficient of variation of density and cover and finally computed by an Index of relative growth (RGI) .-- Copyright 1974, Biological

STUDY OF DRAINAGE PATTERNS IN THE MAHANADI CATCHMENT (ABOVE HIRAKUD DAM).

Indian Agricultural Research Inst., Nagpur. All India Soil Land Use Survey.
N. K. Shende, R. M. Pofali, and V. S. Deshmukh.

J Indian Soc Soil Sci 21(3): 323-327, Illus. 1973.

Descriptors: Asia, *Drainage patterns(Geologic), *Watershed management, Management, *Watersheds(Basins), Dams, *Erosian control. Identifiers: *India(Mahanadi catchment).

Drainage pattern analysis in different landscape units furnishes useful information for watershed management with special reference to erosional features. The Mahanadi catchment, comprising an area of 84,000 km2, was analyzed for drainage pat-tern and drainage texture studies which revealed that the catchment exhibits the development of trellis, annular, rectangular, pinnate phantom, radia, dendritic and braided drainage patterns having fine to coarse drainage textures. In areas having fine textured dendritic pattern, the streams are excessively loaded with finer material of silt while in areas with pinnate, phantom and radial drainage patterns, the streams are charged with coarser material in the form of sand and gravel. Both the areas are the sore spots of erosion and conservaperative.--Copyright 1974, Biological Abstracts, Inc. W75-03835

5. WATER OUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR SIG-NIFICANCE TO OLIGOTROPHIC LAKES, De Paul Univ., Chicago, Ill. Dept. of Chemistry. For primary bibliographic entry see Field 5B. W75-03304

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS, Illinois Inst. of Tech., Chicago. Dept. of Environ-

mental Engineering. R. A. Minear, and S. Schneiderman.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-238 626, \$3.75 in paper copy, \$2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Re-port No 94, 1974. 50 p, 15 fig, 7 tab, 32 ref. OWRT A-064-ILL(1). 14-31-0001-4013.

Descriptors: *Pollutant identification, *Analytical techniques, *Gas chromatography, Cadmium, Copper, Iron, Lead, Nickel, Zinc, Organic compounds, W: *Chelation. ds, Water analysis, *Metals, Heavy metals,

Identifiers: *Metal chelates, Heavy metals analy-

Originally, the application of commercially available monothiohexafluoroacetylacetone (HFAS) and its formation of volatile chelates with metals of environmental significance to rapid, multi-ele-ment analysis was under investigation. Inability to reproduce published results for the Nickel chel led to critical examination of the chelating agent and ultimately to withdrawal of the compound from the commercial market when its identity and purity were found to be questionable. Independent synthesis of HFAS was unsuccessful and initial project objectives were abandoned. Project objectives were redirected to verification and extension of previous studies involving the lead chelate of 2,2,6,6-tetra-methylheptane-3,5-dione (PIV). Extraction studies were conducted using flameless atomization atomic absorption for analysis but are of questionable value as a result of analytical inconsistencies. Gas chromatographic studies indicated previously reported synthesis of Pb(PIV)2 had likely not been achieved. Both HFAS and PIV studies were unsuccessful and have resulted in programs of independent synthesis and continued research. W75-03305 esearch

PESTICIDE ANALYSIS FROM URBAN STORM RUNOFF, Nebraska Weslevan Univ., Lincoln.

G. Dappen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 593, 33.75 in paper copy, \$2.25 in microfiche. Addendum to Completion Report 'Water Quality Models for Urban and Suburban Areas', August 21, 1974, 40 p. OWRT A-025-NEB(2).

Descriptors: Water quality, *Urban runoff, Pesticides, *Storm runoff, *Pollutant identification, *Pesticide residues, Heptachlor, Chlorinated hydrocarbon pesticides, Rainfall.

Identifiers: Lindane, Dacthal.

Urban storm runoff was analyzed for pesticide content. Hexachlorobenzene (HCB), pentachloronitrobenzene (PCNB), heptachlor, heptachlor epoxide, lindane, and dacthal were identified and selected for monitoring. Lindane and dacthal were primarily used in the determination of the profile and runoff patterns during a rainstorm. Although pesticide concentrations were higher near the end of the runoff period, the largest amount of pesticide flushing from an area oc-curred during the maximum runoff period. Major rains, rains that followed periods of wet weather, or rains of longer duration produced higher quanti-ties of pesticides running off than moderate rains of high intensity following dry periods. Much variation in the amount of pesticide running off was encountered. (See also W75-03311) W75-03312

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY, Environmental Protection Agency, Washington, D.C. Office of Research and Development. Available from the National Technical Information Service, Springfield, Va. 22161, as PB-227 113, \$4.75 in paper copy, \$2.25 in microfiche. Report January 1973. 92 p, 8 fig, 11 tab, 2 append.

Descriptors: *Long-term planning, Environmental engineering, Planning, *Monitoring, Data collections, *Nevada, *Remote sensing, *Comprehensive planning, Bioindicators, Pollutant identification Identifiers: *Las Vegas(Nev).

Results of a comprehensive examination of the fu-Results of a comprehensive examination of the fu-ture mission of the Environmental Protection Agency's Las Vegas Office of Research and Moni-toring (ORM) are summarized. Officially designated a National Environmental Research Center in 1972, the laboratory's primary thrust has been environmental engineering with present programs including sampling and monitoring activi-ties, aerial surveillance, and remote sensing for a number of agencies in addition to EPA. The history of the laboratory, its organization, administrary of the laboratory, its organization, administra-tive services, personnel, and facilities are reviewed. Present monitoring programs are discussed. Seven NERC project areas are identified which can best be performed at the La-Vegas site: (1) aerial surveillance support, (2) development and field testing of aerial remote sensing devices, (3) biological monitoring of the

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environment. (4) development and field testing of noise monitoring instruments, (5) development and demonstration of monitoring networks, (6) development of data interpretation techniques, and (7) special staff studies. Project examples to implement each of these program areas are demonstrated. (Schroeder-Wisconsin)

THE NASA ROLE IN MAJOR AREAS OF HUMAN CONCERN.

Denver Research Institute, Colo. Available from the National Technical Information Service, Springfield, Va. 22161, as N73-25426. \$3.25 in paper copy, \$2.25 in microfiche. NASA Report NASA-CR-133049, February 1973. 17 p, 42 ref. NASW-2362

Descriptors: *Pollution abatement, *Pollutant identification, Chemical analysis, Analytical techniques, *Monitoring, Measurement, Weather forecasting, Energy, Satellites(Artificial), Aircraft, *Remote sensing, Environmental effects,

*Monitoring.
Identifiers: Energy conservation, Solar energy

Attempts to integrate space technology and information gathering systems into environmental planning are reviewed. Much of this integration centers on joint efforts to develop pollution monitoring equipment. NASA Lewis Research Center is assisting Cleveland in developing an air pollution monitoring system; NASA Langley and Ames Research Centers are assisting California in as-sessing the impacts of aerosols and in applying NASA sensing technology to environmental and safety problems (forest fire detecting). NASA Ames Research Center has also participated with the Coast Guard in a program for detecting and determining the size of oil slicks via sensing devices. Other NASA programs have aided in the study of weather forecasting and the impacts of pollution on the weather as well as in the discovery and development of new energy resources. (Schroeder-Wisconsin) W75-03349

TRANSURANIC SOLID WASTE MANAGE-MENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974. Los Alamos Scientific Lab., N. Mex.

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as Rept. No LA-5666-PR, \$4.00 in paper copy, \$2.25 in microfiche. Report No LA-5666-PR, July 1974. 27 p, 6 fig, 5 tab, append.

Descriptors: Management, *Radioactive waste, *Waste disposal, *Waste treatment, Waste *Waste disposal, *Waste treatment, Waste storage, Transportation, Radioactivity effects, Corrosion, Corrosion control, Safety, Evaluation, Air pollution, Water pollution, Soil contamination, Public health.

Identifiers: Radiolysis, *Transuranics.

Progress is reviewed for three transuranic solid waste management research programs funded by the AEC Division of Waste Management and Transportation during the period of January-March 1974. The interim storage criteria for transuranic wastes have been redesignated as guidelines and will be issued as a Los Alamos Scientific Laboratory document after incorporation of final revisions. Studies of corrosion of mild steel in humid air have shown that Zinc Chromate Underseal, Chemical and Water-Resistant Restoleum Industrial Coating, and Rust Gard do not prevent corrosion. Analyses of the gaseous products of radiolysis of cellulosics contaminated with 1.2 mg 238Pu/g waste matrix have shown hydrogen and carbon dioxide to be the major products. Waste production is being evaluated on an individual process basis, and flowsheets are being prepared to show material input and waste output for each plutonium handling process. The

Transuranic-Contaminated Solid Waste Treatment Development Facility has been redesigned to permit increased research ability and flexibility. The program to evaluate past burial practices has been redirected to emphasize local burial areas. Fluid dynamics computer codes are being evaluated for use in soil transport, atmospheric dispersion, and resuspension models. Agricultural and population data are being obtained for the areas surrounding Los Alamos. (Houser-ORNL)

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES, Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS. Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03422

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE: A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION

Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.

. Linnman, A. Andersson, K. O. Nilsson, B. Lind. and T. Kjellstrom. Arch Environ Health, Vol 27, No 1, p 45-47, 1973,

Illus. Identifiers: *Absorption, *Atomic absorption, *Cadmium, *Neutron activation analysis, Nutrients, *Sewage sludge, *Wheat, Analytical techniques, Pollutant identification.

Wheat was grown in test pots at 4 different sewage sludge concentrations and 3 different pH levels in order to study the Cd uptake from sewage sludge. The sludge contained 10 ppm Cd, which is below the average Cd concentration in sludge from Swedish sewage sludge plants. The analysis of Cd in wheat was performed by 2 methods, atomic absorption and neutron activation analysis, and good agreement was found between results from the methods. The Cd uptake increases strongly with increasing sewage sludge concentrations. Cd from sewage sludge used as a plant nutrient source is resorbed by plants. The pH of the soil was of great importance for the uptake of Cd. Lower pH gave greater Cd_uptake.—Copyright 1974, Biological Abstracts, Inc. W75-03503

DETERMINATION OF MERCURY IN WATER AND PLANT MATERIAL BY FLAMELESS ATOMIC ABSORPTION.

Ghent Rijksuniversiteit (Belgium). Faculteit Landbouwwetenschappen. L. Kiekens, M. Verloo, and A. Dhaese.

Meded Fac Landbouwwet Rijksuniv Gent, Vol 38,

Meded Fac Landbouwwet Rijksuniv Gent, Vol 38, No 1, p 9-14, 1973.
Identifiers: Alfalfa, *Atomic absorption, Corn(Field), Leaves, *Mercury, Spinach, Tobacco, Water pollution, Sampling, *Pollutant identification, Water analysis, *Analytical techniques.

The possibilities of flameless atomic absorption for the determination of Hg in water and plant material (spinach, corn leaves, tobacco leaves and alfalfa) are described. For the destruction of plant material a rapid digestion procedure at relative low temperature is described, using a mixture of con-centrated nitric and sulfuric acid with V2O5 as a catalyst. The detection limit of the method is about 0.15 ppb for water samples and 0.1 ppm in the dry matter for plant material.--Copyright 1974, Biological Abstracts, Inc.

W75-03504

MONITORING 2,4-D RESIDUES AT LOX-AHATCHEE NATIONAL WILDLIFE REFUGE. Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab. D. P. Schultz, and E. W. Whitney. Pestic Monit J, Vol 7, No 3/4, p 146-152, 1974,

Identifiers: Cassidix-mexicanus, Eichhornia-crassipes, Fish, *Florida(Loxahatchee National Wildlife Refuge), Gallinula-chloropus, *Monitoring, Mud, *National Wildlife Refuges, Pollution, Refuge, Weedicide, Wildlife, *2-4-D, *Pesticide residues, Water quality, *Pollutant identification, *Path of pollutants.

Over 7000 acres along the Hillsboro perimeter canal in Loxahatchee National Wildlife Refuge (NWR), Florida, were sprayed in 1971 with the dodecyl-tetradecyl amine salts of 2,4-D ((2,4dichlorophenoxy) acetic acid) (DTA-2,4D) at a rate of 4.48 kg acid equivalent (a.e.)/ha to control waterhyacinth (Eichornia crassipes). Three stations were established along the canal to collect samples of fish, water and mud for residue analysis and to monitor water quality. The initial appli-cation of 2,4-D, followed by spot treatments of DTA-2,4-D and/or the dimethylamine salt of 2,4-D (DMA-2,4-D) over a 4 mo. period, achieved excel-lent control of water hyacinth. The highest 2,4-D residue level measured in water (0.037 mg/l) was found on the day following the initial treatment. The highest levels in hydrosol (0.005 mg/kg) occurred 3-15 days after treatment. Among 60 samples of fish, 3 had herbicide residue levels greater than 0.010 mg/kg, 16 had less than 0.010 mg/kg, and the remainder had no detectable residue levels. Breast muscle and liver of common Florida gallinules (Gallinula chloropus) had residue levels of 0.30 mg/kg and 0.675 mg/kg, respectively, 1 day after spraying, and no detectable residues 4 days after spraying. The herbicide apparently caused no ill effects on hatching of boat-tailed grackle (Cassidix mexicanus) eggs or development of fledglings.-Copyright 1974, Biological Abstracts, W75-03506

ACCUMULATION EXPERIMENTS WITH LIN-DANE IN A CULTURE OF DUNALIELLA FOR STANDARDIZATION OF AN ALGAE TEST. (AKKUMULATIONSVERSUCHE VON LINDEN IN EINER KULTER VON DUNNALIELLA SPEC. ZUR STANDARISIERUNG EINES ALGENTESTES),

Hamburg Univ. (West Germany). Institut fuer Hydrobiologie und Fischereiwissenschaft. For primary bibliographic entry see Field 5C. W75-03508

PHYSIOLOGICAL AND ECOLOGICAL SIGNIFICANCE OF THE CHEMICAL INSTABILITY OF THE URIC ACID AND RELATED PU-RINES IN SEA WATER AND MARINE ALGAL CULTURE MEDIUM, Fisheries and Marine Service, Vancouver (British

Columbia). Vancouver Lab. For primary bibliographic entry see Field 5C. W75-03512

MERCURY CONTENT OF FISH AND SHRIMPS CAUGHT OFF THE BELGIAN COAST, Ministere de l'Agriculture, Ostend (Belgium). Sea Fisheries Research Station.

For primary bibliographic entry see Field 5C. W75-03518

DISSOLVED OXYGEN REQUIREMENTS OF NEWLY-HATCHED LARVAE OF THE STRIPED BLENNY (CHASMODES BOSUI-ANUS), THE NAKED GOBY (GOBIOSOMA

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

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BOSCI), AND THE SKILLETFISH (GOBIESOX STRUMOSUS), Muskingum Coll., New Concord, Ohio.

For primary bibliographic entry see Field 5C. W75-03519

AUTOMATIC DOSAGE OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD (DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),
Institut d'Hygiene et d'Epidemiologie, Brussels

G. Verduyn, and A. Derouane. Atmospheric Environment, Vol 8, No 7, p 707-

715, July, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: Automation, *Sulfates, Measurement, *Analytical techniques, Equipment, *Rain water, *Pollutant identification. Identifiers: *Nephelometric methods.

An automatic nephelometric method for the determination of low concentrations of sulfate is described. It permits the determination of concentrations as low as 0.1 microgram per cu cm. Sulfate ions are precipitated by means of barium perchlorate and fifty samples can be analyzed in an hour. This method is applicable to the determination of sulfate amounts in rain water. The equipment used is a Technicon Auto Analyser, connected with a two monochromators spectrofluorimeter. (Prague-FIRL)

DETERMINATION OF N,N-DIALKYL DITHIOCARBAMATES IN WASTE WATER BY THIN-LAYER DENSITOMETRY, Canada Centre for Inland Waters, Burlington

F. I. Onuska Analytical Letters, Vol 7, No 5, p 327-334, 1974. 1

*Herbicides. *Waste Descriptors: water(Pollution), Analytical techniques, Copper,
"Pollutant identification, "Thiocarbamate pesticides, Carbamate pesticides.
Identifiers: N-N-dialkyl dithiocarbamates,

*Densitometry.

The increasing awareness and importance of very small amounts of various herbicides in waste water has greatly stimulated refinement and exten-

fig. 2 tab, 20 ref.

sion of analysis pertaining to water media. The quantitative determination of N,N-dialkyl dithiocarbamates tetramethylthiuram disulfide and N, N-dialkyl tetramethylthiuram monosulfide in waste water was studied by thin-layer densitometry of their copper complexes. A densitometer provides a simple and rapid means to quantify these compounds. N,N-dialkyl dithiocarbamates were analyzed in microgram quantities using this method. (Pragueand rapid means to quantify these compounds.

W75-03537

AN AUTOMATED METHOD FOR DETER-MINATION OF CHLORIDE AND SULFATE IN FRESHWATER USING CATION EXCHANGE AND MEASUREMENT OF ELECTRICAL CON-

Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.

M. P. Stainton.

Limnology and Oceanography, Vol 19, No 4, p 707-711, July 1974. 2 fig, 5 tab, 6 ref.

Descriptors: *Water analysis, *Chlorides, *Pollutant identification, *Sulfates, Freshwater, Descriptors: *Cation exchange, *Electrical conductance, Ion exchange, Water properties, Analytical techniques, Surface waters, Chemical analysis, Nitrates, Fluorides, Iodides, Bromides, Halogens, Dissolved solids, Salts.

A simple automated adaptation of Mackereth's manual method for determining chloride and sulfate in freshwater is described, using hydrogen ion-exchange to convert chloride and sulfate salts to their free acids with detection by electrical conductance. The use of silver-saturated exchange resin to precipitate chloride permits distinction between chloride and sulfate. Detection limit is good at 2 microequivalents/liter with excellent precision (plus or minus 1.5% at 200 microequivalents/liter). High levels of nitrate, orthophosphate, and fluoride gave positive interference for sulfate; bromide and iodide similarly interfere with chloride estimates. (Witt-IPC)

DETERMINATION OF TOTAL WATER HARD-NESS BY CONDUCTOMETRIC TITRATION WITH COMPLEXING AGENTS (DETERMINAREA DURITATII TOALE A APEI PRIN TITRARI CONDUCTOMETRICE CU COMPLEXONI), Institutul Politehnic, Iasi (Rumania).

N Alelenei

Buletinul Institutului Politehnic din Iasi, Sectia II: Chimie, Vol 20 (24), No 1-2, p 23-28, 1974. 3 fig, 1 tab, 8 ref. English summary.

Descriptors: *Water analysis, *Hardness(Water), Water properties, "Analytical techniques, "Water properties, "Analytical techniques, "Water chemistry, Volumetric analysis, Cations, Calcium, Magnesium, Iron, Aluminum, Copper, Manganese, Chelation, Nitrilotriacetic acid, Aqueous solutions

Identifiers: Complexometry, Electroconductance, Conductometry, Chelating agents, Ethylenediaminetetraacetic Triethanolamine, acid. EDTA.

Triethanolamine, nitrilotriacetic acid, and the diand tetrasodium salts of EDTA (ethylene-diaminetetraacetic acid) were used as complexing agents in low-frequency (50 Hz) conductometric titrations of total hardness in waters and dilute aqueous solutions. The tetra-sodium EDTA was buf-fered with sodium borate at pH 9-10. Triethanolamine permitted total hardness determinations in the presence of trivalent Fe and traces of divalent Cu and Mn. However, the presence of Al ions interfered with the titration of Ca and Mg. (Brown-IPC) W75-03604

AUTOMATED PHOSPHATE ANALYSIS IN THE PRESENCE OF ARSENIC, Canada Centre for Inland Waters, Burlington

(Ontario). P. D. Goulden, and P. Brooksbank.

Limnology and Oceanography, Vol 19, No 4, p 705-707, July, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Water analysis, *Phosphates, *Pollutant identification, *Colorimetry, *Arsenic compounds, Analytical techniques, Color reactions, Water properties, Inorganic compounds, Chemical analysis, Automation.

An automated method is described for eliminating arsenate interference in the determination of phosphate in natural waters by the molybdenum blue method. The arsenate is reduced to arsenite by thiosulfate in an acidic medium before the color-producing reagents are added. (Witt-IPC) W75-03607

THE DETERMINATION OF ARSENIC BY NON-DISPERSIVE ATOMIC FLUORESCENCE SPEC-TROMETRY WITH A GAS SAMPLING

TECHNIQUE, Hitachi Ltd., Tokyo (Japan). Central Research

K. Tsujii, and K. Kuga. Analytica Chimica Acta, Vol 72, No 1, p 85-90, September, 1974. 7 fig.

Descriptors: *Fluorescence, *Spectroscopy, *Arsenic compounds, *Analytical techniques, Metals, Testing procedures, Instrumentation, Pollutant identification

Arsenic was converted to arsine in a mixed acid medium containing iodide, tin (II) and zinc powder and was atomized in a hydrogen-argon-entrained air flame. A microwave-excited (2450 MHz) electrodeless arsenic discharge lamp, a solar-blind photomultiplier, and a lock-in amplifier were used. The burner slot configuration was shown to have an effect on the maximal fluorescence intensity. Three configurations were tried. The flame composition was not a critical factor regarding the fluorescence intensity when the argon flow rate was kept constant. However, the noise level was markedly affected by the flame composition, and the signal-to-noise ratio was improved with low flow rates of hydrogen. The burner height also had an effect on the fluorescence intensity. The detection limit of arsenic, defined as the quantity for which the signal-to-noise ratio was equal to 2, was 2 ng and the linear working range covered nearly 3 decades of concentration. (Pulliam-Vanderbilt) W75-03612

A STUDY OF ADSORPTION CHARAC-TERISTICS OF TRACES OF CHROMIUM(III) AND (VI) ON SELECTED SURFACES, Louisiana State Univ., Baton Rouge. Dept. of

Chemistry. A. D. Shendrikar, and P. W. West.

Analytica Chimica Acta, Vol 72, No 1, p 91-96, September, 1974. 3 fig, 1 tab, 9 ref.

Descriptors: *Water sampling, *Chromium *Heavy metals, Laboratory tests, *Adsorption, Chemical analysis, Reliability, *Analytical techniques, Sampling, *Pollutant identification.

The losses of chromium (III) and (VI) due to adsorption on the walls of containers of pyrex, flintglass and polyethylene were investigated. These materials were selected since they are very commonly used for sample storage purposes. Chromium (III) or (VI) solutions were stored in beakers at different hydrogen ion concentrations, and losses due to adsorption were measured at various contact times by counting the gamma-ray activity from chromium-51 radiotracer. At pH 6.95, chromium (III) solutions showed the greatest instability. In polyethylene beakers, losses reached 25% of the initial metal concentration in 15 days. Similar results for flint glass and pyrex were 19% and 17% respectively. Losses during a contact time of 24 hours were negligible. Chromium (III) solutions in 0.5% nitric acid as well as at a pH of 3.1 showed losses of less than 0.5% at the end of 15 days. The behavior of chromium (VI) showed a completely different pattern from that of chromium (III). Losses of less than 1.0% were observed on all three materials at the end of 15 days at pH 6.95. (Pulliam-Vanderbilt) W75-03613

THE OPENING UP OF INSOLUBLE OXIDES (TANTALUM, NIOBIUM, CHROMIUM, ALUMINIUM, AND OTHERS), WITH LIQUID SELENIUM DIOXIDE, Philips Gloeilampenfabricken N.V., Eindhoven (Nickschaften)

(Netherlands). B. J. Mulder.

Analytica Chimica Acta, Vol 72, No 1, p 220-222, September, 1974, 5 ref.

Descriptors: *Analytical techniques, *Oxides, *Metals, *Solvents, Separation techniques, Solvent extractions, Testing procedures, Laboratory tests, *Pollutant identification.

Liquid selenium dioxide is a useful solvent for a large number of 'insoluble' oxides. Details were given for Ta205, Nb205, Cr203 and Al203, with directions for the preparation of aqueous solu-tions. Pyroselenites were derived from the cor-

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responding oxides by substituting Se205 for oxygen. Although most metal oxides rapidly dissolved in, or reacted with, liquid selenium dioxide, silica in the form of quartz glass was much less reactive. Pyrex glass was attacked at about the same rate as quartz glass, but gave rise to con-tamination by a larger number of elements. For Cr203, there seemed to be no alternative method that left the chromium in the trivalent state. The only 'undissolved' oxide of those investigated was Sn02. An attractive feature of selenium dioxide is its high vapor pressure which permits purification by sublimation. (Pulliam-Vanderbilt) 75-03614

RARE EARTH ELEMENTS IN FERROMAN-GANESE NODULES AND OTHER MARINE

Washington Univ., Seattle. Dept. of Oceanography.

For primary bibliographic entry see Field 5B. W75-03615

MERCURY DETERMINATION AT MICROGRAM LEVEL BY A REDUCTION-AERATION METHOD OF CONCENTRATION. Western Washington Research and Extension

Center, Puyallup. Y. Kimura, and V. L. Miller. Analytica Chimica Acta, Vol 27, No 4, p 325-331,

October, 1962. I fig, 3 tab, 9 ref.

Descriptors: *Mercury, *Analytical techniques, *Separation techniques, *Photometry, Aeration, Filtration, Tin, *Pollutant identification. Identifiers: *Microanalysis.

A method for the determination of mercury using a concentrating aeration procedure at room temperature following digestion of the samples with sulfuric acid, hydrogen peroxide and potassium permangate was discussed. Its chief advantages were elimination of filtration, applicability to mer-cury solutions in sulfuric acid to 22N, nitric acid to 8N, and nitric and sulfuric mixtures to 4N and 8N respectively and ability to concentrate dilute mercury solutions during the process of mercury separation in order that the entire sample may be taken for analysis. Final analyses were made from solutions of constant composition and volume regardless of the original material and volume of the digest or solution. Mercury was concentrated dur-ing the separation and was determined by a direct photometric dithizone procedure. The technique was applicable for 0.10 microgram mercury per sample charge with a standard deviation for a single determination of 0.05 microgram mercury in the 0 to 0.5 microgram range. (Jernigan-Vanderbilt) W75-03617

ATOMIC ABSORPTION SPECTROPHOTOMETRIC DETERMINATION OF MICROGRAM LEVELS OF CO, NI, CU, PB, AND ZN IN SOIL AND SEDIMENT EXTRACTS CONTAINING LARGE AMOUNTS OF MN AND FE, Geological Survey, Denver, Colo.

T. T. Chao, and R. F. Sanzolone Journal of Research of the U.S. Geological Survey, Vol 1, No 6, p 681-685, November-December, 1973. 2 fig, 7 tab, 14 ref.

metals, *Anary...
*Variability, Descriptors: "Heavy metals, "Analytical techniques, "Soils, "Sediments, "Variability, Spectroscopy, Cobalt, Nickel, Copper, Lead, Zinc, Manganese, Iron, Instrumentation, *Pollutant identification. Identifiers: Atomic absorption spectroscopy.

An atomic absorption spectrophotometric method was developed for the determination of seven metal ions in the hydroxylamine extract of soils and sediments. Mn, Fe, and Zn were directly determined in the aqueous extract upon dilution

Co, Ni, Cu, and Pb in a separate aliquot of the extract were chelated with APDC (ammonium pyrrolidine dithiocarbamate) and extracted into MIBK (methyl isobutyl ketone) before determination. Data were presented to show the quantitative recovery of microgram levels of Co, Ni, Cu and Pb by APDC-MIBK chelation-extraction from synthetic solutions containing as much as 2000 micrograms/ml Mn or 50 micrograms/ml Fe. Recovery of known amounts of the metal ions from sample solutions was equally satisfactory. Reproducible results were obtained by replicate analyses of two sediment samples for the seven metals. (Pulliam-Vanderbilt) W75-03618

RADIORESPIROMETRY: RAPID TOXICOLOG-ICAL SCREENING OF ENVIRONMENTAL POLLUTANTS,

National Environmental Research Center, Cincinnati, Ohio. Environmental Toxicology Research Laboratory.
S. D. Lee, R. M. Danner, L. McMillan, W. Moore,

Jr., and J. F. Stara.

News of Environmental Research in Cincinnati. October 11, 1974. 4p, 2 fig, 3 tab, 22 ref.

Descriptors: *Sulfur, *Analytical techniques, *Environmental effects, *Toxicity, *Mercury, Biochemistry, Metabolism, Respiration, Animal physiology, Laboratory animals, Testing physiology, Laboratory animals, Testing procedures, *Pollutant identification. Identifiers: *Radiorespirometry, Methylmercury.

The objective was to develop new techniques or to apply existing methods that are capable of detect-ing early biochemical lesions, before the appearance of overt toxic symptoms, resulting from low concentrations of environmental pollutants. Radiorespirometry is such a technique and was used to measure expired 14CO2 in a biological system metabolizing 14C-labeled compounds. CO2 excretion responds rapidly to changes in the metabolic alterations of the body. The effects of SO2 and methylmercury exposure on 14CO2 output were studied. Intragastric administration of methylmercury chloride 24hr before testing suppressed 14CO2 output following intravenous injection of 1-14C-glucose. These changes may or may not be detrimental to the animals; an a from the normal pattern of glucose catabolism was merely indicated. The main significance was that a biochemical change was detectable at low concentrations of 0.05 and 0.1 mg per kg levels, in vivo. (Pulliam-Vanderbilt) W75-03619

SELECTIVE DETERMINATION OF IRON IN ALLOYS BY REACTION WITH 2,3-PYRIDINEDIOL AND RING COLORIMETRY, M.M.H. College, Ghaziabad (India). Dept. of Chemistry.

For primary bibliographic entry see Field 2K. W75-03623

DETERMINATION OF LEAD IN ATMOSPHER-IC PARTICULATES BY FURNACE ATOMIC

Varian Instrument Div., Palo Alto, Calif. J. F. Lech, D. Siemer, and R. Woodriff. Environmental Science and Technology, Vol 8, No 9, p 840-844, September, 1974. 8 fig, 2 tab, 18 ref. NSF (GP28055).

Descriptors: *Lead, *Air pollution, *Analytical techniques, *Spectroscopy, Toxicity, Filters, Porous media, Trace elements, *Pollutant identifi-

Identifiers: Atomic absorption.

The use of furnace atomic absorption along with porous graphite filtration for the determination of atmospheric lead was discussed. Using the Woodriff furnace as the atomization device and cups made of porous graphite, air samples were

taken and the cups were inserted into the furnace for determination with no other chemical or physical treatment. The sensitivity of the determination based on a minimum detectable recorder deflection of 1% was 2.5 x 10 to the minus 12th power gram/sample, equivalent to 0.005 microgram/cu m for a 100-cc air sample. When a standard particulate generator was used, the porous graphite compared favorably with Millipore filters. Organic lead however, was not found to be retained by either type of filter. (Jernigan-Vanderbilt) W75-03624

KINETIC-COULOMETRIC DETERMINATION OF MERCURY IN BIOLOGICAL SAMPLES, Maryland Univ., College Park. Dept. of Chemis-

T.J. Rohm, and W. C. Purdy.
T.J. Rohm, and W. C. Purdy.
Analytica Chimica Acta, Vol 72, No 1, p 177-182,
September, 1974. 4 tab, 18 ref.

Descriptors: *Analytical techniques, *Mercury, *Colorimetry, *Heavy metals, *Bioassay, Fish, Water pollution, Testing procedures, *Pollutant

Samples were destroyed in a sealed pressure bottle by strong oxidizing agents. The procedures en-sured that no Hg was lost by volatilization. After most of the organic matter in the sample had been destroyed, the Hg was extracted with dithizone in toluene. Chloride and EDTA addition before extraction prevented Ag from being extracted and interfering in the kinetic-coulometric method. The Hg is then back-extracted into 5M hydrochloric acid for assay by the kinetic-coulometric procedure, which is sensitive to 10 ppb Hg. Catalysis of the kinetic reaction was dependent on the Hg activity in the sample, which is influenced by the chloride content of the test solution. In order to avoid errors in the assay procedure, the method of standard additions was employed to compensate for small changes in Hg activity due to changes in chloride concentration. Recoveries of Hg added to samples before analysis ranged from 94.0 to 107.5% of the added Hg. The amounts of Hg found in urine and fish samples analyzed by this method were in agreement with those levels determined by other procedures. (Pulliam-Vanderbilt) W75-03627

SEPARATION OF COPPER (II) FROM URANI-UM (VI) AND MANY OTHER ELEMENTS BY CATION-EXCHANGE CHROMATOGRAPHY IN ACETONE-HYDROBROMIC ACID MEDIA -IMPROVED SELECTIVE SEPARATION OF COPPER.

National Chemical Research Lab., Pretoria (South Africa)

F. W. E. Strelow, A. H. Victor, and C. H. S. W.

Analytica Chimica Acta, Vol 69, No 1, p 105-110, March, 1974. 3 fig, 2 tab, 3 ref.

Descriptors: *Separation techniques, *Trace elements, *Cation exchange, *Chromatography, Copper, Uranium radioisotopes, Acids, Magnesium, Nickel, Manganese, Aluminum, *Pollutant Nickel, Manganese, Aluminum,

Additional selectivity in a separation by ion-exchange chromatography can be obtained by changing from one eluting system giving a certain selectivity sequence to another system giving a different sequence. The procedure provided an excellent means for the selective separation of copper from all the elements retained together with it after the group forming more stable chloride complexes was eluted with 0.2M hydrochloric acid in 85% acetone. Elution of copper (II) was sharp and quantitative while U(VI), Co(II), Li, Na, Mg(II), Ni(II), Ti(IV), Be and Al were quantitatively retained by the column used. (Jernigan-Vanderbilt)

PHOTOMETRIC TITRATION OF BERYLLI-UM(II) WITH 5-SULFOSALICYLIC ACID, Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
For primary bibliographic entry see Field 2K.
W75-03629

THE EXTRACTION OF NICKEL FROM VARI-OUS SALT SOLUTIONS WITH OXINE IN CHLOROFORM,
Shizuoka Univ., Hamamatsu (Japan). Faculty of

Engineering. For primary bibliographic entry see Field 2K. W75-03630

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE,

National Environmental Satellite Service, Hillcrest Heights, Md.

A. E. Strong.

Remote Sensing of Environment, Vol 3, No 2, p 99-107, 1974. 7 fig, 8 ref.

Descriptors: *Remote sensing, *Eutrophication, *Circulation, Satellites(Artificial), Aircraft, Lake Erie, Utah, Photography, Wavelengths, Monitor-

ing. Identifiers: *Utah Lake(Utah), ERTS-1.

As aircraft flights werê being made over Lake Erie on October 15, 1972, underflying the Earth Resources Technology Satellite (ERTS-1), a long dark streamer was observed. The phenomena of such algal blooms, characterizing eutrophic condi-tions, have been noticed on other shallow lakes using ERTS-1. The concentration of the algae into long streamers provides additional information on surface circulations. To augment the ERTS Mul-tispectral Scanner Subsystem (MSS) data of Lake Erie an aircraft was used to obtain correlative thermal-IR and additional multiband photographs. The algal bloom is highly absorptive in the visible wavelengths but reverses contrast with the surwavelengths out reverses contrast with the sur-rounding water in the near-IR bands. The absorp-tion of shortwave energy heats the dark brown algal mass, providing a hot surface target for the thermal-IR scanner. Bloom of Aphanizomenon flos-aquae observed in Utah Lake together with recent bloom history in Lake Erie is used to verify the Great Lakes bloom. Although most Great Lake algae blooms can be expected to be on a scale barely resolved by the ERTS system, a careful in-terpretation and some judicious computer processing and image enhancement should reveal many algae bloom situations that would otherwise go unnoticed. (Jones-Wisconsin) W75-03760

ULTRAVIOLET ABSORPTION/SALINITY COR-RELATION AS AN INDEX OF POLLUTION IN INSHORE SEA WATERS, University Coll. of North Wales, Manai Bridge.

Marine Sciences Lab.

P. Foster. N Z J Mar Freshwater Res 7(4): 369-379, 1973. Identifiers: "Fiji Islands, Inshore, "Pollution in-dices, "Salinity, Sea water, Streams, "Ultraviolet absorption, "Pollutant identification.

UV absorption spectra of fresh and marine waters along the southern coast of Viti Levu, Fiji, are recorded. Variations in the magnitude of the absorption from streams devoid of human influence limit the use of such measurements as a sensitive index of organic pollution. However, where there is a significant difference between the absorption magnitudes of adjacent streams, these can be individually identified in coastal waters by concurrent absorption and salinity measurements. Such measurements characterize water masses in inshore waters, and indicate the origin of their freshwater components. Consequently the method has particular relevance in sea areas influenced by fresh waters with enhanced UV absorbance due to

organic pollution.--Copyright 1974, Biological Abstracts, Inc. W75-03767

CHEMICAL ANALYSES FOR WATER OUALI-

TY - TRAINING MANUAL.

Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-224 212, \$10.25 in paper copy, \$2.25 in microfiche. Report No EPA-4301-73-003, February 1973. 398 p, 184

Descriptors: *Analytical techniques, *Chemical analysis, *Water quality, *Training, Ammonia, Biochemical oxygen demand, Carbon, Chemical oxygen demand, Caroon, Chemical oxygen demand, Chlorine, Dissolved oxygen, Hardness(Water), Iron, Flame photometry, Manganese, Nitrates, Spectrophotometry, Nitrites, Legal aspects, Laboratory tests, Pesticides, Phenols, Phosphorus, Conductivity, Surfactants, Trace elements, Spectroscopy, Chromatography, Infrared radiation, Remote sensing, Data collec-tions, *Pollutant identification. Identifiers: *Training manuals, Atomic absorption spectrophotometry, EPA-NTC Course 100.

This manual is a supplement to the training program which provides specialized instruction in the field of water pollution control enabling application of new research findings through updating of skills of technical and professional personnel, and to train new employees recruited from other professional or technical areas in the special skills required. It provides an overview of the nature, causes, prevention, and control of water pollution. Better management of the water resource and more engineering research are urgently needed. The statistical methods deal with the presentation and analysis of numerical data from samples. Methods deal with analytical reactions (standard solutions), acidity, alkalinity, pH, and buffers. Relative to dissolved oxygen determination, factors affecting DO concentration in water and the analytical method background are given. Many determinations for nutrients, nitrogen, carbon are presented, among them: sources and analysis of organic nitrogen, laboratory procedure for total hardness, determination of phosphorus in the aqueous environment. Principles of emission spectroscopy, flame photometry, principles of absorptroscopy, rame photometry, principles of absorp-tion spectroscopy, and atomic absorption spec-trophotometry, other instrumentations, and or-ganic analyses with laboratory procedures are in-cluded. Legal procedures in which water quality evidence may be used, followed by case preparation and courtroom procedure are detailed. (Jones-Wisconsin) W75-03785

ON THE LEAD CONTENT OF HUMAN HAIR (1871-1971),

Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.

W. Lockeretz. Science, Vol 180, p 1080, 1973. 8 ref.

Descriptors: *Lead, *Testing procedures, *Temporal distribution, Analytical techniques, Human physiology, *Pollutant identification. Identifiers: *Human hair.

A recent report showed that the lead content of human hair was much lower in 1971 than between 1871 and 1923 (Weiss, et al, Science Vol 178, p 69, 1972). The assumption made by Weiss that this finding demonstrates that overall intake of lead has decreased despite an increase in atmospheric lead levels is disputed. Because the study showed the 1871-1923 children's hair samples to contain 164 ppm and adults' samples to contain 93 ppm of lead (both much greater than levels of workers with overt lead intoxication), the lead content of these antique hair specimens is not a valid indica-tor of lead intake. The reason for the discrepancy

seems to be that Weiss, et al, did not distinguish between lead incorporated into the growing hair (endogenous) and lead subsequently acquired from external sources (exogenous). (Jernigan-Vanderbilt) W75-03789

GRAVIMETRIC ESTIMATION OF SILVER AS DIAMMINESILVER (I) TETRAISOTHIO-CYANATODIANILINECHROMATE (III). Lucknow Univ. (India). Dept. of Chemistry. S. K. Bhargava, P. K. Mathur, and R. Gopal. Current Science, Vol 43, No 13, p 408-409, July 5, 1974. 2 ref.

Descriptors: *Analytical techniques, Estimating, *Metals, Gravimetric analysis, Estim Bromine, Chlorine, *Pollutant identification.

Silver(I) can be estimated by tetraisothio-cyanatodianilinechromate(III) anion in presence of Cl- and small amount of Br- ions as diamminesilver(I)-tetraisothiocyanatodianilinechrominesilver(1)-tetraisothiocyanatodianilinechro-mate(III). Freshly prepared alcoholic solution of (aniline) H (Cr(NCS)4 (aniline)2) with Ag (NH3)2 Cl solution gave a rose precipitate, (Ag(NH3)2 (Cr(NCS)4(aniline)2) which was insoluble in water and common organic solvents and was easy to wash. The high molecular weight (m.w. = 612) of the precipitated compound rendered it possible to estimate silver (I) in minute quantities. The ratio of silver and the precipitated compound was 1:5.67. A number of experiments involving solutions containing varying amounts of silver and several metal ions confirmed the reliability of the method. (Pulliam-Vanderbilt) W75-03790

METHOD FOR DETERMINATION OF SELENI-UM, ARSENIC, ZINC, CADMIUM, AND MER-CURY IN ENVIRONMENTAL MATRICES BY NEUTRON ACTIVATION ANALYSIS, National Bureau of Standards, Washington, D.C.

Activation Analysis Section.
E. Orvini, T. E. Gills, and P. D. LaFleur.
Analytical Chemistry, Vol 46, No 9, p 1294-1297,
August 1974. 6 tab, 6 ref.

Descriptors: *Heavy metals, *Analytical techniques, *Radioisotopes, *Neutron activation analysis, Selenium, Zinc, Cadmium, Mercury, Standards, Testing procedures, Separation techniques, Trace elements, *Pollutant identification, Chemical analysis.

The problem of selecting a suitable matrix for the determination of As, Se, Zn, Cd, and Hg by neutron activation analysis was discussed. The most sensitive and useful (n, gamma) reactions involve short half-lived isotopes of As, Zn, Cd, and Hg, thus requiring chemical separation of these elements from the activated matrix. Most separation methods reported involved dissolution of the matrix, often requiring different methodology for each different matrix. A combustion technique was modified and extended to separate quantitatively As, Zn, Cd, Hg and Se from different biological materials and materials of environmental interest. The quantitative recovery of Se, As, Zn, Cd and Hg through the proposed separation procedure was checked initially using long lived isotopes of these elements added to non-irridiated matrices. The activity recovered was compared with the activity of a like quantity of tracer counted in the same standard geometry. After those preliminary tests, the method was checked by analyzing some previously certified standard reference materials, for which the concentrations of the elements determined covered a wide range. (Jernigan-Vanderbilt) W75-03792

DETERMINATION OF MERCURY IN FLUOR-SPAR MINING SURVEY SAMPLES, British Steel Corp., Sheffield (England). J. Davey, and M. M. Nicholson.

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5A—Identification Of Pollutants

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-225 716, \$3.25 in paper copy, \$2.25 in microfiche. October 1973. 5 p., 3 fig. 3 tab, append.

Descriptors: *Mercury, *Mining, *Analytical techniques, *Rocks, *Spectroscopy, Pollutants, Industrial wastes, Mining industry, Exploration, *Pollutant identification, Surveys. Identifiers: *Fluorspar, Fluorite, Absorption spec-

The development of a method for the determination of mercury at the trace level in fluorspar min-ing survey samples was described. The method utilized a cold vapor atomic absorption technique. The effect of possible interfering elements was examined; results obtained when applied to typical samples were described. The method developed provided a simple, quick and reliable way of deter-mining trace level amounts of mercury in siliceous, shale and calcareous materials. No ous interferences were detected. Because of the level of contents being determined, high purity reagents were used and blank values were determined. A limit of detection of 0.03 microgram Hg was possible for a 10cm pathlength gas cell. (Jernigan-Vanderbilt) W75-03794

DETERMINATION OF THE COMPOSITION AND THE STABILITY CONSTANTS OF COM-PLEXES OF MERCURY (II) WITH AMINO ACIDS.

Amsterdam Univ. (Netherlands). Lab. for Analyti-

cal Chemistry. W. E. Van Der Linden, and C. Beers.

Analytica Chimica Acta, Vol 68, No 1, p 143-154, January, 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Mercury, *Amino acids, Chemistry, Organic compounds, Ions, Stability, Hydrogen ion concentration, Metals, *Pollutant identification, Chemical analysis.

Identifiers: *Complexes(Mercury), Mercury com-

The complex formation of mercury (II) with twenty of the most important amino acids was investigated, and the corresponding stability constants were reported. Calculations were based on simultaneous pH and pM measurements of solu tions containing the amino acid in excess with respect to mercury. It was shown that most amino acids form mononuclear monoligand complexes as well as mononuclear biligand complexes. A dif-ferent behavior was observed for histidine and methionine, for which the complexes become strongly protonated at lower pH values. (Jernigan-Vanderbilt) W75-03798

BACTERIOPHAGES AS VIRAL POLLUTION INDICATORS.

Technion - Israel Inst. of Tech., Haifa. Environmental Engineering Lab. Y. Kott, N. Roze, S. Sperber, and N. Betzer. Water Research, Vol 8, p 165-171, March, 1974. 7

tab. 10 ref.

*Analytical Descriptors: techniques. *Bioindicators, *E coli, *Enteric bacteria, *Bacteriophage, *Viruses, Water pollution sources, Coliforms, Pollutant identification. Identifiers: Coliphages.

The use of bacteriophages as viral pollution indicators was investigated. f2 Phage, attenuated Polio I (LSC) strain introduced daily to a 350 liter experimental oxidation pond showed no decrease in bacterial viruses 2 or other coliphages or Polio I strain. Ratios of coliphages to human enteric viruses ranged in flood waters from concentrations as low as 1:1 to as high as 10,000:1; in wastewater at various seasons the ratio was 1,000,000:1; in trickling filter effluents in winter 100,000:1; in spring

1,000,000:1, in summer and fall 100,000:1; in oxidation pond effluents in winter 10,000:1, in spring 100,000:1, and in summer and fall 10,000:1. In three epidemics in small communities caused by failure of water supply, coliphages were found. At the same time only two samples were postivie human enteric viruses (the third was contaminated with yeasts). Chlorination experiments using the experimental oxidation pond showed that f2 was most resistant. MS2 was very resistant, and coliphages were more resistant than attenuated Polio I virus. Experiments with the oxidation pond effluents showed that coliphages were at least as or even more resistant to chlorine than human enteric viruses. For the purposes of routine microbiological examinations the use of E. Coli B bacteriophages provides an adequate measure of the viral quality of water. (Murphy-FIRL)

EVALUATION OF TOLERANCE LIMITS OF SOME TOXIC SUBSTANCES IN INDUSTRIAL WASTE WATERS BY THE ICHTHYO TOXICI-

TY TEST, (IN ITALIAN), Camerino Univ. (Italy). Istituto di Igiene.

M. Guerra, and N. Comodo. Boll Soc Ital Biol Sper 48(22): 989-901, 1972(1973). Identifiers: Albumus-albidus, Alkyl benzenesulfonate, Ammonia, Carassius-auratus, Chlorides, Chromates, DDT, *Industrial wastes, Mercury, Phenols, Potassium, Salmo-irideus, Toxic wastes, *Toxicity, Waste waters, *Lethal limit, *Pollutant identification.

The icthyotoxicity test was evaluated for its usefulness in assessing the permissible limit of single toxic substances in liquid industrial waste. Toxic substances frequently present in ground water, i.e. mercury chloride, potassium bichromate, ammonia, phenol ABS (alkyl benzene sulfonate) and DDT, were tested on 3 species of fish (Carassius auratus, Alburnus albidus and Salmo irideus) of different sensitivity to industrial poisons. S. irideus was the most sensitive. The effect of the poisons on the fish was evaluated by mortality rates after 48 h exposure to the pollutants. This method is not suitable for the evaluation of the presence of quantities of toxic substances in liquid waste larger than the maximal permissible quantities. The method is not sensitive enough case of individual toxic substances, but it is of value in the case of mixtures of toxic substances present in industrial effluents.—Copyright 1974, Biological Abstracts, Inc. W75-03821

HEAVY METAL CONTENTS IN TAIWAN'S CULTURED FISH, Academia Sinica. Taipei (Taiwan). Inst. of Zoolo-

S. S. Jeng, and Y-W. Huang.

Bull Inst Zool Acad Sin (Taipei), Vol 12, No 2, p 79-85 1973

Identifiers: Cadmium, Carp, Copper, *Cultured fish, Food, Grass carp, *Heavy metals, Lead, Mercury, Milkfish, Nickel, Oysters, Silver carp, *Taiwan, Tilapia, Zinc, *Pollutant identification.

In order to find out whether fish around the waters of Taiwan are safe as to heavy metal contents, 119 fish of Tilapia, common carp, grass carp, silver carp and milkfish, and 240 oysters from the fish pond were analyzed for concentrations of Cd, Cu, Pb, Hg, Ni and Zn. Most of the fish surveyed have a concentration of Hg less than 0.08 ppm and none of them over 0.2 ppm. The Pb level of fish muscle is 0.1 ppm, and 0.5 ppm for oyster. The Cd in fish muscle and oyster is 0.02 ppm and 0.2 ppm, respectively. The contents of Cu, Zn, and Ni studied are at ordinary levels. The heavy metal concentrations of Taiwan's cultured fish do not appear to constitute a hazard for consumers.--Copyright 1974, Biological Abstracts, Inc. W75-03850

5B. Sources Of Pollution

SOURCES OF PHOSPHORUS INPUTS FROM THE ATMOSPHERE AND THEIR NIFICANCE TO OLIGOTROPHIC LAKES.

De Paul Univ., Chicago, Ill. Dept. of Chemistry.

T. J. Murphy.

Available from the National Technical Informa-Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 625, \$4.25 in paper copy, \$2.25 in microfiche. Research Report No 92, 1974. 45 p, 10 tab, 35 ref. OWRT A-065-ILL(2), 14-31-0001-4013.

Descriptors: *Phosphorus, *Precipitation(Atmospheric), *Lake Michigan, Nutrients, Smoke, *Air pollution, Eutrophication, *Illinois, Water pollution sources, *Path of pollutants, Lakes, Pollutant identification.
Identifiers: Particulate matter, Oligotrophic lakes, *Chicago(Ill), Orthophosphates

Precipitation in the Chicago area was analysed and found to contain .034 mg/l of phosphorus with about one half of this present as ortho phosphate. Because of the small amounts of phosphorus needed to stimulate the growth of organisms in bodies of water which are phosphorus limited, these inputs from the atmosphere are important to many natural bodies of water. From one-fifth to one-third of the phosphorus going into Lake Michigan is from precipitation. The sources of this phosphorus were investigated; almost all sources were found to be of particulate matter. With the exception of emissions from the fertilizer industry these were found to contain a relatively consistent 0.1 percent phosphorus. Since the discharge of particulates to the atmosphere is being controlled, contributions of phosphorus to bodies of water from the atmosphere would also be controlled. W75-03304

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLOR-SVILLE LAKE,

Kentucky Water Resources Research Inst., Lexington.

For primary bibliographic entry see Field 5C. W75-03309

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICA-

TIONS ON SOIL, Nebraska Univ., Lincoln. Dept. of Agricultural Engineering. O. E. Cross

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 562, \$3.25 in paper copy, \$2.25 in microfiche. Technical Paper 74-4059 presented at the 1974 Annual Meeting of the American Society of Agricultural Engineers, Oklahoma State Univ., Stillwater, June 23-26, 1974. 29 p, 21 fig, 1 tab, 13 ref. OWRT B-012-NEB(3). 14-31-0001-3610.

Descriptors: Water quality control, *Water pollution sources, Nitrogen, Sodium, Potassium, *Farm wastes, *Crop production, *Rates of application, Application methods, Crop response, *Agricultural runoff, Potable water. Identifiers: Nitrate nitrogen.

Beef feedlot manure has been applied to cultivated and irrigated crop land for four years. Research variables were: four rates of manure application, three depths of plowing and three plant populations. Results reported are relative to the pollu-tional aspects of the surface runoff water and the underground aquifer as well as crop response. Nitrate nitrogen displacement in the runoff water exceeded the potable water allowable of 10 only during the first 90 minutes of the first irriga-tion on the heavily manured plots. The concentration of sodium in the runoff, even under the most

Sources Of Pollution-Group 5B

adverse conditions, did not exceed the maximum allowable for potable water-1,000 ppm. Potable water quality relative to potassium has been set at a maximum of 10 ppm. The highest potassium concentration runoff was 120 ppm. However, this runoff is acceptable as reuse irrigation water. Relative to crop yield, only the manure treatment indicated a statistically significant increase. Over the decated a statistically significant inference. Over the 4-year period, crop yield, in general, has not decreased. Plant population and plow depth had no significant effect on yield. The underground water, after 4 years and 9 months of testing, has retained its potable quality. W75-03310

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS. Nebraska Univ., Lincoln

Available from the National Technical Informa-System the National Technical Information Service, Springfield, Va 22161 as PB-238 622, \$5.25 in paper copy, \$2.25 in microfiche. Completion Report, August 1, 1974, 108 p, 2 fig, 1 tab, 3 ref, 3 append. OWRT A-025-NEB(2).

Descriptors: *Water quality, *Urban runoff, Runoff, *Model studies, Cities, Suburban areas,
*Storm runoff, *Simulation analysis,
*Hydrograph analysis, Computer models, Water pollution sources.

Urban storm runoff was sampled and analyzed for various pollutional parameters. Data obtained were used in the development of modeling techniques for simulating the quantity and quality of runoff. A hydrograph simulation model developed by the Department of Computer Science at the University of Nebraska was used to generate flow hydrographs comparable to ob-served runoff data. Modeling techniques similar to those used in the EPA Storm Water Management Model were used for modeling COD, BOD and solids. Data were also obtained relative to concentrations of nitrogen, phosphorus, pesticides and bacteria in the runoff. Data generally confirmed the 'flush effect' of pollutants at the start of the rustorm water may contain significant amounts of pollutants. (See also W75-03312) (Andersen-Nebraska) W75-03311

MOBILITY AND DEACTIVATION OF HERBI-CIDES IN SOIL-WATER SYSTEMS,

Nebraska Univ., Lincoln. Water Resources

Research Inst. T. L. Lavy.

Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-238 632, \$3.75 in paper copy, \$2.25 in microfiche. Comple-tion Report, June 1974. 30 p, 11 tab, 13 ref. OWRT tion Report, Ju-A-024-NEB(1).

Water quality. *Herbicides. Descriptors: *Degradation(Decomposition), Adsorption, *Mobility, Resins, Soil water, *Nebraska, Soil profiles, *Path of pollutants, Aqueous solutions, 2-4-D, Bioassay, Soil analysis, Colloids.

Identifiers: Charcoal, Exchange resins, Atrazine, Butylate. Column leaching studies, Alachlor,

The objectives were: (1) to investigate methods which could be used to deactivate or remove herbicides present in aqueous systems; and (2) to measure the mobility of four herbicides (alachlor, atrazine, butylate and picloram) in three Nebraska soil profiles. Charcoal and exchange resins were effective in removing as much as 99% of the 1.2 ppmw herbicide present in an aqueous solution. In a degradation study, the presence of soil colloids and other soil constituents markedly enhanced the breakdown rate of atrazine, alachlor and 2,4-D in a 24-week storage study. A cucumber bioassay was used to detect herbicides remaining in the solution while a soil bioassay using soybeans and millet was effective in monitoring for herbicides in the

soil. Studies to determine if degradation of herbicides occurs in samples of groundwater incubated at 10 and 25C for periods up to 15 months showed picloram was more stable than atrazine or alachlor. Considerably less degradation occurred at the lower temperature (which is comparable to field conditions). A field leaching study showed that mobility becomes more rapid as the herbicide moves farther from the surface. Picloram was more mobile than atrazine or butylate under irrigated sandy soils. W75-03314

INFLUENCE OF FERTILIZER PRACTICES ON WATER AND THE QUALITY OF THE EN-VIRONMENT (PHASE II), Nebraska Univ., Lincoln. Water Resources Research Inst.

R. A. Olson.

Available from the National Technical Informastroin Service, Springfield, Va 22161 as PB-238 624, \$4.75 in paper copy, \$2.25 in microfiche. Completion Report, June 15, 1974. 82 p, 30 fig, 15 tab, 21 ref. OWRT B-022-NEB(3). 14-31-0001-3908.

quality, *Groundwater, *Nitrogen, Crop production, Management, *Nebraska, Soil analysis, Path of pollutants, Irrigation practices, Nitrates, Loess,

Identifiers: Nitrate-nitrogen.

Comparison of deep soil cores taken under various crop management systems with adjacent native pasture indicates that generally fertilizer is contributing only minimal amounts of nitrogen to the groundwater (with non-irrigated agriculture) in Nebraska. Under irrigated conditions, nitrogen is leaching to the water table with the greatest amount occurring on sandy soils with shallow water table. An additional threat to the groundwater exists in southwestern Nebraska where the deep loess soils on the table lands are being put under irrigation and the loess beneath contains several tons of NO3-N per acre of natural or 'geologic' origin. Average nitrate-nitrogen in the groundwater of Nebraska has increased 25 percent during the past decade. Rapid increases with present high levels are found in several areas with intensive irrigation of sandy soils. Nutrients in Nebraska's surface water are primarily of natural origin or from industrial and sewage wastes of cities. Nutrients tend to accumulate in reservoirs with subsequent deterioration of the reservoir and improvement of the emergent stream. The results indicate a need for improved fertilizer and water efficiency under irrigated conditions and further investigation into the environmental hazards associated with extensive irrigation development on the table lands of high subsurface nitrate.

MERCURY LEVELS IN FISHES FROM SOME MISSOURI LAKES WITH AND WITHOUT

KNOWN MERCURY POLLUTION,
Missouri Univ., Columbia. Environmental Trace
Substance Center.

S. R. Koirtyohann, R. Meers, and L. K. Graham. Environmental Research, Vol 8, No 1, p 1-11, Au-gust 1974. 4 fig, 5 tab, 20 ref. OWRT A-054-MO(2). 14-31-0001-3525.

Descriptors: *Mercury, Fish, *Missouri, Lakes, Pollution, *Fungicides, *Path of pollutant, *Bass, Bioindicators, Water pollution sources. Identifiers: *Golf greens drainage, Mercury com-

Mercurial fungicides used in golf greens maintenance can lead to elevated levels of mercury in fish, from lakes receiving greens drainage. Of the species tested, the largemouth bass was the most sensitive indicator with levels ranging from 1 to 7 g Hg/g of wet tissue in fish taken from lakes which receive drainage from treated greens. Background mercury levels in largemouth bass from impoundments in central Missouri are 0.1 - 1.2 ppm depending on size and other factors. Many lakes with no known source of mercury contamination produce bass which contain significantly more than 0.5 ppm of mercury. W75-03323

EPIDEMIOLOGIC RELATIONSHIPS
BETWEEN HUMAN AND ANIMAL SALMONELLA CARRIERS AND THEIR ENVIRONMENT IN THE SWIES PROVISOR MENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN),

Institut fuer Medizinisches Mikrobiologie Kantons Sankt Gallen (Switzerland).

For primary bibliographic entry see Field 5C. W75-03330

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH), Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
B. R. Gamboa-G., A. J. Garcia, J. Benitez-A., and

Bol Inst Oceanogr Univ Oriente Cumana, Vol 10,

No 2, p 55-72, 1971. English summary. Identifiers: *Chemical studies, *Hydrographic studies. dies, Influx, Inversion, Lagoons, Nitrogen, Or-ganic matter, Oxygen, River, Seasonal, Tempera-ture, Venezuela(Tacarigua Lagoon), Water pollution sources.

Hydrographical and chemical observations were carried out in Tacarigua Lagoon, Venezuela, from April, 1967-Dec., 1969. Due to the shallow water depth (1.0-1.38 m in average), the temperature variation and distribution were affected as much by seasonal change (dry and rainy season) as by daily changes. Vertical inversions of temperature were occasionally noted on the western part (A-zone) and the central area (C-zone). Local and seasonal salinity variations were influenced by river-influx and sea-water penetration, especially on the western side (A and B zones). Salinity variations in the mideastern area were less noted. In general, the O2 content showed little monthly and yearly change in the mid-western area. Phosphate, silicates, nitrates and nitrites showed pronounced monthly and yearly fluctuations. They showed highest values in the western area. Conversely, the high values of ammonia and organic N were observed in the eastern area and the lowest values on the western side.—Copyright 1974, Biological Abstracts, Inc. W75-03335

CHEMISTRY CHEMISTRY OF SOME SEDGELAND WATERS: LAKE PEDDER, SOUTH-WEST SEDGELAND TASMANIA. Tasmania Univ., Hobart (Australia). Dept. of

R. T. Buckney, and P. A. Tyler.

Aust J Mar Freshwater Res Vol 24, No 3, p 267-273, 1973

Identifiers: *Australia, Biotic communities. *Chemistry, Lakes, Peat, Rainfall, Salinity, *Sedgeland waters, *Tasmania(Lake Pedder),

Hydrogen ion concentration.

Surface waters of the Lake Pedder (Tasmania, Australia) area are characterized by low salinity, low pH, high color and a relative major-ion com-position near that of seawater. Factors determining this composition are predominance of inert rocks, a covering of sedgeland peat isolating waters from rock contact and a high rainfall brought by prevailing oceanic winds. Frequency and intensity of rainfall appear to determine the pattern of chemical variation. Salinity, bicarbonate and pH may change rapidly during periods of high rainfall. Humic acids are important chemical constituents of the waters and probably determine the type of biotic community which inhabits them.--Copyright 1974, Biological Abstracts, Inc. W75-03390

Group 5B-Sources Of Pollution

SOLAR RADIATION MEASUREMENTS IN THE ENTERPRISE RADIATION FOREST.

Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station. For primary bibliographic entry see Field 5C.

ARGONNE NATIONAL LABORATORY, WASTE MANAGEMENT PROGRAMS QUARTERLY REPORT, OCTOBER-DECEMBER 1973, Argonne National Lab., Ill. For primary bibliographic entry see Field 5D. W75-03415

CONSOLIDATION TECHNIQUES FOR FUEL CLADDING HULLS, Argonne National Lab., Ill.

For primary bibliographic entry see Field 5D. W75-03416

SALVAGE OF ALPHA-CONTAMINATED

Argonne National Lab., Ill. For primary bibliographic entry see Field 5D. W75-03417

STORAGE OF TRITIUM AND NOBLE GASES, Argonne National Lab., Ill. For primary bibliographic entry see Field 5D. W75-03418

COLLECTION AND ANALYSIS OF PUMP TEST DATA FOR TRANSMISSIVITY VALUES, Battelle Pacific Northwest Lab., Richland, Wash. Water and Land Resources Dept.

K. L. Kipp, and R. D. Mudd.

Available from NTIS, Springfield, Va 22161, as Rept No BNWL-1709; \$5.45/copy, \$2.25/microfiche. Report No BNWL-1790, 1973. 84 p, 40 fig, 4 tab, 16 ref, append.

Descriptors: *Transmissibility, Hydrology, *Aquifer characteristics, *Well data, *Data collections, *Subsurface investigations, Thesis equation, Analytical techniques, Model studies, Aquifers, Hydrologic data, Flow, Subsurface flow, Flow measurement, Flow profiles, Model studies.

Identifiers: Boulton model, Dagan model.

Described is the analysis of well pump tests per-Described is the analysis of well pump tests per-formed in 1969 to determine the field measured transmissivity values used in 'The Transmissivity Iterative Calculation Routing - Theory and Numer-ical Implementation,' BNWL-1706. Previously ac-cumulated pump test transmissivity values which were also used as input data are included for completeness and the analytical models employed for pump test analyses are described. A sensitivity study was performed on the pertinent variables and procedures of the pump test analyses. Tables of transmissivity results and the graphs used to ob-tain them are included. (Houser-ORNL) W75-03421

EXPERIMENTAL SUPPORT STUDIES FOR THE PERCOL AND TRANSPORT MODELS, Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept.

water and Land Resources Dept.
R. C. Routson, and R. J. Serne.
Available from NTIS, Springfield, Va 22161, as
Rept No BNWL-1719; \$5.45/copy,
\$2.25/microfiche. Report No BNWL-1719, 1972.
76 p. 7 fig, 24 tab, 20 ref, 2 append. AEC AT(45-1)2130.

Descriptors: Water pollution, *Soil contamination, *Radioactivity, *Path of pollutants, *Model studies, *Transport, Movement, Flow, Hydrologic models, Absorption, Ion exchange, Calcium, Sodium, Hydrogen ion concentration, Percolation, Filtration, Centrifugation, Transmissibility, GroundA group of support studies conducted during development of a transport model for the Radionuclides in Soils Program is described. Measurement studies for sorption parameters con-cluded that: (1) small calcium experiments are more useful than batch experiments for measuring the Kd of trace solutes which are sorbed by ion-exchange, unless the batch system is prewashed several times with influent prior to measuring the Kd; (2) the decrease in Kd often reported with an increasing soil-to-solution ratio is the result of the reaction of the soil solid phase with the influent solution; (3) batch and small column Kds will agree if the equilibrium chemical environment is equivalent; and (4) the number of regression equations required to adequately define sorption in soil column work is a determinable function for each soil. (Houser-ORNL)

CHARACTERIZATION OF ACTINIDE BEAR-ING SOILS: TOP SIXTY CENTIMETERS OF 216-Z-9 ENCLOSED TRENCH,
Battelle Pacific Northwest Labs., Richland, Wash.

Water and Land Resources Dept.

L. L. Ames. L. L. Ames.
Available from NTIS, Springfield, Va 22161, as
Rept No BNWL-1812; \$5.45/copy,
\$2.25/microfiche. Report No BNWL-1812,
February 1974. 141 p, 3 fig, 25 tab, 7 ref, append.
AEC AT(45-1)-2130.

Descriptors: *Waste disposal, *Nuclear wastes, *Soil contamination, *Path of pollutants, Plutonium, Sites, Locating, Soil investigations, Earth materials, Rocks, Minerology, Minerals, Radioactivity, Chemical reactions, Analysis, Evaluation, Safety, *Washington.
Identifiers: Trench disposal, Hanford site(Wash),

Under pre-1965 waste disposal practices at Han-ford, certain actinide-bearing solutions were discharged to the soil in covered trench facilities. The soil response to the influx of acidic, actinidebearing solutions has pertinence to the present and future locations of the actinides. In order to un-derstand present and future soil-actinide relationships, the following tasks were investigated: (1) Identification of the soil minerals and soil rock types; (2) Location of the actinides; (3) Determination of the present actinides form; (4) Characterization of the soil-solution chemical reactions that resulted in the present form and location of the actinides. Results are presented of work on the above tasks through examination of samples from the upper 60 centimeters of the 216-Z-9 covered trench. (Houser-ORNL) W75-03423

POTENTIAL CONTAINMENT FAILURE
MECHANISMS AND THEIR CONSEQUENCES
AT A RADIOACTIVE WASTE REPOSITORY IN
BEDDED SALT IN NEW MEXICO,
Oak Ridge National Lab., Tenn.
H. C. Claiborne, and F. Gera.
Available from NTIS, Springfield, Va, 22161 as
Rept No ORNL-TM-4639; \$4.00/copy,
\$2.25/microfiche. Report No ORNL-TM-4659, October 1974. 89 p. 5 fig. 13 tab, 71 ref, append.

tober 1974. 89 p, 5 fig, 13 tab, 71 ref, append.

Descriptors: *Radioactive waste disposal, Solids, Descriptors: "Radioactive waste disposal, Solids, "Waste treatment, "Waste disposal, Mining, Hazards, Safety, Technology, Nuclear explo-sions, Faults(Geologic), Earthquakes, Aquifers, Leaching, Leakage, "New Mexico. Identifiers: "Salt mines, "Waste repository, Materials."

Meteorites.

Potential containment failure mechanisms are examined and their probabilities and consequences are estimated, when possible, for a hypothetical waste repository located in bedded salt in south-eastern New Mexico. The primary conclusion is that a serious breach of containment for such a repository, either by human action or natural events, is only a very remote possibility and falls into the category of least likely occurrences which affect society. A sealed repository 600 m underground would be virtually sabotage proof; even the surface burst of a 50-megaton nuclear weapon could not breach the containment. Accidental drilling of boreholes through the disposal horizon could cause relatively minor local contamination. (Houser-ORNL) W75-03425

A ONE-DIMENSIONAL NUMERICAL MODEL OF PRECIPITATION SCAVENGING WITH APPLICATION TO RAINOUT OF RADIOACTIVE

California Univ., Livermore. Lawrence Liver-

C. R. Molenkamp.

No UCRL-51627; \$4.00/copy, \$2.25/microfiche.

Report No UCRL-51627, July 1974. 39 p, 25 fig, 2 tab. 20 ref.

Descriptors: *Model studies, *Climatic data, Descriptors: "Model studies, "Climatic data, *Precipitation(Atmospheric), Mathematics, Height, Clouds, Convection, Suspended solids, Radioactivity, Dusts, Water pollution, Drops(Fluids), Evaporation, Suspension, Mea-surement, "Radioactive wastes. Identifiers: "Scavenging, "Debris.

A one-dimensional, time-dependent, entrainment model of cumulus convection has been modified to include a calculation of precipitation scavenging. The primary method of scavenging is postulated to be collection of suspended debris in cloud droplets during condensation nucleation and the subsequent inertial capture of these polluted droplets by falling raindrops. Other possible collection mechanisms are neglected, including inertial capture of debris particles by falling raindrops and at-tachment of debris to droplets or drops because of phoretic, diffusive, or electrical forces. Resuspension of debris because of evaporation of droplets and drops is modeled. Calculations are described for scavenging by a typical cumulus cell. Parameter studies are performed to examine the dependence of debris deposition on the initial height of debris in the atmosphere and on the fraction of debris passing through the condensation nuclea-tion activation zone that serve as condensation nuclei. (Houser-ORNL) W75-03427

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY GRANITE, California Univ., Livermore. Lawrence Liver-

more Lab. A. G. Duba, H. C. Heard, and M. L. Santor.

Available from NTIS, Springfield, Va, 22161 as Rept No UCRL-51626; \$4.00/copy, \$2.25/microfiche. Report No UCRL-51626, July 1974. 23 p, 6 fig, 13 ref.

Descriptors: *Mechanical properties, *Rock properties, *Rock mechanics, Rocks, Crystalline rocks, *Granites, Physical properties, Pressure, Pores, Porosity, Pore water, Porous media, Strength, Stress, Strain, Compressive strength, Confined water, Compressibility.

Jacketed samples of Westerly granite with water concentrations ranging from 0 to 20% total volume were loaded to failure under conditions of uniaxial stress up to 600 MPa confining pressure. Unjacketed samples, exposed directly to the pressure medium, were tested similarly. The volume and viscosity of fluid available to the intergranular viscosity of fluid available to the intergranular porosity in the granite during uniaxial stress loading significantly influenced the compressive strength. Dry and saturated specimens (0.8% water) were loaded to 700 MPa confining pressure under conditions of uniaxial strain. Large differences in loading paths were observed between the saturated and dry granite. The pressure-

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volume curves determined to 300 MPa indicate only slightly less compression for the saturated granite (0.8% water) than for the dry material. Under axial load, the saturated material exhibited less volume decrease than the dry. This difference in compression during axial loading is attributed to water distribution in the cracks of the rock. (Houser-ORNL) W75-03428

A GEOLOGICAL AND SEISMOLOGICAL IN-VESTIGATION OF THE LAWRENCE LIVER-MORE LABORATORY SITE,

California Univ., Livermore. Lawrence Liver-

L. H. Wight.

Available from NTIS, Springfield, Va, 22161 as Rept No UCRL-51592; \$4.00/copy, \$2.25/microfiche. Report No UCRL-51592, June 1974. 43 p, 20 fig, 6 tab, 51 ref, append.

Descriptors: Geology, Geologic formations, *Geologic investigations, *Sites, *Faults(Geologic), *Seismology, *Earthquakes, Seismic design, Seismic properties, Seismic studies, Geologic history, Geomorphology, *California, Hazards.

Identifiers: *Tesla fault(Calif), Seismic history,

Livermore Valley(Calif), Response spectrum.

In response to an AEC request for Safety Analysis Reports for all critical structures on the Lawrence Livermore Laboratory site, the seismic hazard at LLL was examined. The geology and seismology of the Livermore Valley and surrounding regions are reviewed and all the active faults in the region are identified based on seismic history, geomorphology and geodetic data. After carefully estimating the accelerations that the site would experience from maximum magnitude earthquakes on each active fault, it is concluded that the Tesla fault has the most potential for doing damage at the LLL site. The response spectrum is derived. (Houser-ORNL)

THE DISSOLUTION OF PU-238 IN ENVIRON-MENTAL AND BIOLOGICAL SYSTEMS. J. H. Patterson, G. B. Nelson, and G. M. Matlack. Available from NTIS, Springfield, Va 22161, as

Rept No LA-5624, \$4.00 in paper copy, \$2.25 in microfiche. Report No LA-5624, July 1974. 6 p, 2 tab. 24 ref.

*Plutonium. *Solubility. Descriptors: Descriptors: Futurinally, Ecosystems, *Chemical properties, *Stable isotopes, Isotope studies, Aqueous solutions, Water, Distillation, Saline water, Chemical reactivity. tions, Ions, Physical properties, Radioactivity, *Radioisotopes, Environmental effects.

Results from experiments on dissolution rates of 238PuO(sub 2) and 239PuO(sub 2) in distilled water and normal saline solution were compared with rates calculated from data in the literature on various PuO(sub 2) dissolution experiments. The ranged of dissolution experiments. Ine initial comparatively rapid dissolution rates were found to vary widely, even between experiments performed ostensibly under the same conditions. In contrast, the lower rate of dissolution, which began a few hours after contact of the oxide with the aqueous medium, was constant and fell within a range of 1 to 6 ng/sq m's under widely varying conditions. (Houser-ORNL)

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POL-LUTION AND TRANSFER RELATIONSHIPS, Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships. Available from the National Technical Information Service, Springfield, Va 22161, as PB-229 782, \$4.25 in paper copy, \$2.25 in microfiche. Final report (partial). September 1973. 50 p, 11 tab, 15 fig, 31 ref. GI-33369.

*Estuaries, Water ponument, models, *Pollution abatement, River, Descriptors: *Mathematical models, *Pollution abatement, *Water pollution control, Delaware River, Delaware River Basin Commission, *Water quality, Water pollution sources, Delaware, Mathewater supply Water demand, Water consumption, Water control, Water policy, Water management, *Water quality control, Water utilization, Water supply development, Water resources, Water resources development, Recreation, Water chemistry, Water Quality Act. Identifiers: *Delaware River Estuary.

Environmental problems and situations are outlined and interim suggestions for remedial action are given. As of July 1973, of the 103 listed dischargers involved in the pollution abatement program, 41 had completed facilities, 12 were in compliance with their schedules, 29 were not meeting their schedules and 21 had yet to submit approvable abatement schedules. Delaware River Basin Commission (DCRB) feels that its 10-year plan to clean up the estuary is proceeding on schedule. Research on the River by DCRB, U.S. Geological Survey and the Philadelphia Water Department is described. Mathematical modeling was employed to prepare a comprehensive program for improvement and maintenance of water quality and to determine relationships between pollution and water quality. Format for initial model was one-dimensional, steady-state, finite-differenced. Improvements on the model resulted in several computer programs briefly described. Areas around the Delaware Estuary are expanding rapidly; most projections show population doubling in 40 years. To supply water for this increase, an assessment of future pollution loads must be available now. Power companies located on the Delaware River must submit a master siting study of any generating plants. Municipal and industrial waste loads must be projected and then managed. Another important factor in pollution abatement is control of rural and urban runoff. At the same time this pollution is occurring, water demand will increase at a similar rate, and as more leisure time is created, there will be greater de-mand for water for recreation. The future state of manu for water for recreation. The future state of the Delaware River depends on how well the fu-ture is predicted, plus successful pollution strategy designed to cope with future pollution loads. (See also W75-03441) (Grden-North Carolina) W75-03440

INVESTIGATIONS ABOUT POPULATION DYNAMICS AND NUTRITIONAL ASPECTS ON THE SIMULID-LARVAE OF A MOUNTAIN STREAM POLLUTED BY ORGANIC WASTE WATER, (IN GERMAN), Freiburg Univ. (West Germany). Limnologisches

R. Gloetel.

Arch Hydrobiol Supplementb. Vol 42, No 3/4, p

406-451, 1973. English summary. Identifiers: Feeding, Filters, Growth rates, *Larvae foods, Mountain, Nutrition, Organic matter, *Population dynamics, *Self purification, Sewage, *Simuliid larvae, Stream, Waste waters, Water pollution sources.

In a stream into which organic matter is introduced, the environmental conditions for the or-ganisms living in it change fundamentally. The ef-fect of this change can be seen on the filter-feeding simuliid larvae, which feed mainly on suspended particulate matter. A short distance below the outlet of the waste water on the number of species of simuliid is reduced. On the other hand a small number of species shows a considerable increase in growth and population. Parallel to the process of self-purification, the number and growth of those species more resistant to change of ecological conditions decrease, whereas the number of the less resistance species increase again. At the end of the polluted stretch, where self-purification is nearly finished, the same species in approximately the same number as above the introduction of the sewage, can be found.--Copyright 1974, Biological Abstracts, Inc. W75-03479

ACCUMULATION, DISTRIBUTION, TRANS-FORMATION AND ELIMINATION OF DDT-14C IN SOLEA SOLEA (PISCES: SOLEIDAE), (IN GERMAN),

Institut fuer Meeresforschung, Bremerhaven

(West Germany).
For primary bibliographic entry see Field 5C. W75-03494

ORGANOCHLORINE INSECTICIDE RESIDUES IN SEDIMENT AND FISH TISSUES, ONTARIO, CANADA, Ontario Ministry of Agriculture and Food, Guelph.

Pesticide Residue Lab. For primary bibliographic entry see Field 5C.

W75-03495

NONBIODEGRADABLE AND OTHER RECAL-CITRANT MOLECULES,

Cornell Univ., Ithaca, N.Y. Lab. of Soil Microbiology. M. Alexander.

Biotechnol Bioeng, Vol 15, No 4, p 611-647, 1973. Identifiers: Environmental studies, Microorganisms, *Molecules(Nonbiodegradable), Pollution, Toxicology, Was-Water pollution, *Biodegradation, chemicals. *Chemical wastes.

Many natural products show remarkable durability in natural ecosystems, and some of these substances are of practical concern. A variety of pesticides, compounds (e.g., polychlorinated biphenyls, synthetic polymers, surfactants, nitrogen compounds, industrial wastes) are also persistant in nature, and this resistance is important because of the large amounts of such chemicals now manufactured and their effects in a variety of environments. The degradation of synthetic chemicals results mainly from microbial activity, and attempts to minimize soil and water pollution would be facilitated by adequate information on why many pollutants are so refractory. Fifteen possible mechanisms of recalcitrance in natural systems are discussed. Biodegradability of a compound often can be increased by appropriate structural modifications. Manufacturing costs may be increased, but if society wishes to enjoy the benefits of synthetic chemicals and yet have an environment free of toxic or offensive materials, it must accept the additional cost.--Copyright 1974, Biological Abstracts, Inc. W75-03497

DISTRIBUTION OF POTENTIAL MOSQUITO VECTORS IN THE IMPERIAL VALLEY, CALIFORNIA, 1971-1972, Walter Reed Army Inst. of Research, Washington, D.C. Dept. of Entomology. For primary bibliographic entry see Field 5G. W75-03498

MONITORING 2,4-D RESIDUES AT LOX-AHATCHEE NATIONAL WILDLIFE REFUGE, Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab. For primary bibliographic entry see Field 5A. W75-03506

Group 5B-Sources Of Pollution

PRELIMINARY EXPERIMENTS ON THE EF-FECT OF THIODAN AND ENDRIN ON FISH CULTURE IN INDONESIA, Research

Inland Fisheries (Indonesia). For primary bibliographic entry see Field 5C.

W75-03515

GROUND-WATER QUALITY STUDY,

Colorado State Univ., Fort Collins. N. F. White, and D. K. Sunada.

Journal of the Irrigation and Drainage Division, Proceedings of ASCE, Vol 100, No IR3, p 277-292, Septembr, 1974. 6 fig, 4 tab, 9 ref.

Descriptors: *Groundwater, Hydrologic aspects, Basins, Drainage, Aquifers, Data analysis, Evapotranspiration, Irrigation, Dissolved solids, *Colorado, *Water quality, *Water pollution

Identifiers: *Severance Basin(Colo).

Groundwater contamination was studied at Severance Basin in Colorado. Water quality was analyzed for both geologic and hydrologic detail. Increasing contamination in the basin was attributed to leaching of applied fertilizer, drainage from silage pits and feed lots, percolation of contaminants from oil field brine pits, and geologic contamination of the aquifer. Data limitations made it difficult to isolate sources of groundwater contamination. Major causes of contamination in this aquifer were concluded to be a combination of a high rate of evapotranspiration and the relatively low surface and groundwater outflow from the basin. This resulted in total dissolved solids in the basin increasing at the rate of 170 ppm per year. When irrigation was accompanied by evapotranspiration rates, mechanism of pollution proved to be a major cause of aquifer contamination. (Prague-FIRL) W75-03534

MIXING AND TRANSPORT, (LITERATURE

Delaware Univ., Newark. Dept. of Civil Engineer-

Journal Water Pollution Control Federation, Vol 46, No 6, p 1591-1604, June, 1974. 126 ref.

Descriptors: *Reviews, *Bibliographies, *Mixing, *Transport, Streams, Rivers, Lakes, Reservoirs, Bays, Estuaries, Coastal areas, Dispersion, Open channel flow, Current, Water pollution, Waste water treatment, Jets, Plumes.

Identifiers: Sinuous channel geometry, Longitudinal dispersion, Transverse turbulent diffusion, Dissolved oxygen.

Dispersion and mixing in open-channel flow were reviewed. The theoretical bases for the one-dimensional, cross-sectiolly averaged concentration equation and the longitudinal dispersion coefficient were also investigated. Laboratory and field data were provided for both vertical and transverse turbulent mixing coefficients. The effect of sinuous channel geometry on longitudinal dispersion was explored experimentally along with the relationships between the bulk flow and channel geometry parameters and the longitudinal disper-sion coefficient using laboratory and natural stream data. The dispersion coefficient increased with increases in stream radius of curvature and decreased with increases in bend length and mean depth. Solutions were found to the convective-diffusion equation for point and line sources in rivers. Integral transform techniques were used to arrive at the solution, and accounted for the presence of surface, bottom, and bank boundaries, assuming constant values for the longitudinal vertical, and lateral turbulent diffusion coefficient, and for the longitudinal current. (Leibowitz-FIRL) W75-03554

SOLUTION, DIFFUSION AND SORPTION IN UPPER LAYER OF LAKE SEDIMENTS: III. CHEMICAL AND PHYSICAL CONDITIONS IN CHEMICAL AND PHYSICAL CONDITIONS IN SEDIMENT-WATER TRANSITION ZONE OF MEROMICTIC BOG LATE (URSEE) AND ITS RELATION TO ACCUMULATION OF VIVI-ANITE, (IN GERMAN), Freiburg Univ. (West Germany). Limnoloaisches Institut

Institut.

Arch Hydrobiol Supplementb, Vol 42, No 3/4, p 273-339, 1973. English summary.

2/3-39, 19/3. Engish summary.
Identifiers: Bogs, Chemical studies, Diffusion,
Lakes, Meromictic bogs, Migration, Physical studies, Precipitation(Atmospheric), Sediments,
Sorption, Vivianite, *Iron, *Phosphates, *West
Germany(Lake Ursee), *Lake sediments, Sediment-water transition zones.

The recent accumulation of Fe (Mn) and phosphate in the sediment of Lake Ursee (West Germany) is directly correlated with vertical and horizontal concentration gradients in the permanently anaerobic deep water and in the interstitial water of the sediment. The small sharply limited area of the highest Fe and phosphate contents in the particulate and dissolved phase of the sediment results from the very sharp concentra-tion gradients in the overlying water and from the morphometry of the monilimnion. The formation of vivianite takes place in the deepest region of the lake (10.55-10.60 m), where the highest concentrations of dissolved Fe and phosphate (35-40 and 4.5-5.5 mg/l respectively, pH = 6.3) exist. The conditional solubility product of vivianite there amounts to (Fe2+)3.(PO43-)2 = 2.4.10-32 (mol)5. The accumulation of vivianite is the result of internal migration of Fe and phosphate from the sediments of lake depths down to about 10.5 m to the sediments of the very deepest region of the lake. Processes of solution, transport and precipitation, especially in the boundary-zones of the anaerobic deep water participate in this migration.—Copyright 1974, Biological Abstracts, Inc. W75-03571

WATER: ITS QUALITY OFTEN DEPENDS ON THE FORESTER,

Food and Agriculture Organization of the United Nations, Rome (Italy).

Unasylva, Vol 26, No 105, p 10-16, Summer 1974. 3 fig. 1 tab. 44 ref.

Descriptors: *Water pollution sources, *Forest *Herbicides, *Lumbering, management. *Pesticides, Weed control, *Water pollution con trol, Streams, Forests, Forestry, Chemicals, Solid wastes, Wood wastes.

Careless logging, especially clearcutting, indiscriminate use of chemicals, such as herbicides, and other ill-planned forest projects may cause stream pollution. Some guidelines are given regarding proper use of insecticides and herbiand control of forest debris and litter. (Sykes-IPC)

A STUDY OF NITRILOTRIACETIC ACID (NTA) DEGRADATION IN A RECEIVING STREAM. Department of the Environment, Ott (Ontario). Wastewater Technology Centre. E. E. Shannon, P. J. A. Fowlie, and R. J. Rush.

Environmental Protection Service, Technology Development Report EPS 4-WP-74-7, August 1974. 34 p, 9 fig, 3 tab, 15 ref.

*Nitrilotriacetic Descriptors: *Biodegradation, Natural streams, *Water pollution sources, Detergents, *Canada, Kinetics, Water properties, Water analysis, Water temperature, Water pollution, Temperature, Seasonal, Monitoring, Tracers, Fluorometry, Harbors, Monitoring, Trace *Path of pollutants. Identifiers: Grindstone Creek(Ontario), Hamilton Harbor(Ontario).

Nitrilotriacetic acid (NTA) levels in Grindstone Creek (the receiving water for the Waterdown, Ontario, waste water treatment plant) were monitored to determine the degree of NTA degradation under summer and winter extremes of water temperature. Sampling stations were established at 6 points over the 5 mile stretch of stream between Waterdown and Hamilton Harbor. Samples were collected under two influent waste water NTA loading conditions (16-20 mg/liter and 8-16 mg/liter) during summer and winter. Stream flow and temperature were closely monitored. Fluorometric tracer studies were integrated with the monitoring program. During the summer period when NTA removal through the treatment plant was in excess of 95%, dilution and degradation combined to given downstream NTA concentrations consistently less than 10 micrograms/liter. In the winter when stream temperatures were 0.5-3.0 C and NTA removal through the plant was less than 45%, downstream NTA concentrations as high as 125 micrograms/liter were encountered. At the same time, levels at the mouth of Grindstone Creek in Hamilton Harbor averaged 40-50 micrograms/liter. There was evidence of in-stream biodegradation at low water temperatures (this was confirmed by laboratory studies). First-order degradation rate coefficients were determined from the laboratory data. (Witt-IPC)

THE INFLUENCE OF A PAPER MILL WITH ADJACENT COATING PLANT ON THE BIOLOGICAL OXYGEN DEMAND OF THE RECEIVING STREAM (DER EINFLUSS EINER PAPIERFABRIK MIT ANGESCHLOSSENER STREICHEREI AUF DEN BIOLOGISCHEN SAUERSTOFFVERBRAUCH DES VORFLU-

Zdruzene Papirnice. Ljubljana-Vevce (Yugoslavia). Wochenblatt fuer Papierfabrikation, Vol 102, No 7, p 243-245, 248, 250, April 13, 1974. 4 fig, 5 tab, 4 ref. B. Iglic, Z. Valentincic, and T. Herfort-Michieli.

Descriptors: *Water pollution sources, *Water pollution effects, *Water quality, Waste water(Pollution), *Pulp wastes, Europe, *Pulp and paper industry, Discharge(Water), Effluents, *Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Hydrogen ion concentration, Water properties, Temperature, Water temperature, Streams.
Identifiers: *Yugoslavia, Coated papers, Ground-

wood pulp, Paper machines, White water.

An integrated Yugoslavian pulp and paper mill which operates a groundwood plant, four paper machines, and an off-machine paper-coating plant is described. The mill discharges its effluent into a stream. The effects of these discharges have been studied for a year. Water quality variations (stream temperature, suspended solids, pH, COD, and BOD) have been sampled at three points below the mill outfall and compared with stream parameters above the outfall. The discharge was shown to have noticeable effects on stream quality as far as 2.5 km downstream. (Speckhard-IPC) W75-03605

KINETICS OF MERCURY ADSORPTION AND DESORPTION IN SEDIMENTS,

Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering. R. S. Reimers, and P. A. Krenkel.

Journal Water Pollution Control Federation, Vol 46, No 2, p 352-365, February, 1974. 17 fig, 3 tab,

Descriptors: *Mercury, *Adsorption, *Sediments, Soil types, Sands, Inorganic compounds, Sediment transport, Hydrogen ion concentration, Chlorides, *Path of pollutants.

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The sorption characteristics of clays, sands and sediment organics with varying pH values, chloride concentrations and mercury species and compounds, including differing mercury concentration were observed, and the potential for inhibition of mercury methylation in the sediments was determined. At a constant pH value, the adsorption of inorganic mercury was definitely affected by increased chloride concentration with a 20 to 100 percent loss in capacity, depending on the constituents of the sediment. Because inorganic mercury binds with sands, clays, and various organics, the contention that mercury pollution is transported in water system by sediments was sup-ported. (Jernigan-Vanderbilt) W75-03610

DIFFUSION OF IONS IN SEA WATER AND IN DEEP-SEA SEDIMENTS, Eidgenossische Technische Hochschule, Zurich

(Switzerland).

(Switzerland). Y-H, Li, and S. Gregory. Geochimica et Cosmochimica Acta, Vol 38, No 5, p 703-714, May 1974. 5 fig, 1 tab, 28 ref.

Descriptors: *Sea water, *Sediments, *Diffusion, *Ions, *Mathematical studies, Anions, Cations, Tracers, Radioisotopes, *Path of pollutants.

The tracer-diffusion coefficients of a given ion in water Dj degrees and in sea water Dj* differ no more than 0-8 per cent, so for the first approximation, Dj degrees values can be safely used as Dj* in sea water. The temperature and pressure dependence of Dj and viscosity, n, of solution are closely related. Since pressure effect on n is small, one can assume the same for Dj. Under the restriction of electro-neutrality, the average diffusion coefficient a Dj* of major cations are greater but of major anion, smaller than their respective Dj* and Dj. But for ions with very low concentration, a Dj* = Dj*. The tracer diffusion coefficient of ions in eby-sea sediment, Dj. sed. and in sea water Dj*, are related by the simple equation: Dj. sed. = Dj* alpha/theta squared. The factor alpha/theta squared of sediment can be determined easily by measuring the tracer diffusion coefficient of Cl-or SO42- in the sediment with the technique described. (Pulliam-Vanderbilt) W75-03611

RARE EARTH ELEMENTS IN FERROMAN-GANESE NODULES AND OTHER MARINE PHASES.

Washington Univ., Seattle. Dept. of Oceanography. D. Z. Piper.

Geochimica et Cosmochimica Acta, Vol 38, No 7, p 1007-1022, July, 1974. 8 fig, 2 tab, 41 ref.

Descriptors: *Trace elements, *Marine geology, *Path of pollutants, *Neutron activation analysis, Distribution patterns, Metals, Sediments, Oceans, Seawater, Shales, Transfer, Pacific Ocean, Iron, *Pollutant identification. Identifiers: Rare earth elements.

The concentrations of rare-earth elements (REE) have been measured in 31 ferromanganese nodules from the Pacific and Indian Oceans and vary by almost a factor of 5. Too few nodules have been analyzed to define possible regional trends. The shale-normalized patterns, however, permit divi-sion of nodules into two groups: those from depth greater than 3000-3500 m and those from less depth. The factors that determine this change in the relative concentration of REE may be related to the mineralogy of manganese phases and/or the transport of REE to the deep ocean by particulate matter. Comparison of the REE patterns of nodules with those of philipsite, phosphoric clays, CaC03 and seawater suggests that the pat-terns of these phases reflect fractionation from an initial pattern closely resembling that of shale. By assuming that the accumulation rate of REE in clays, CaCO3 and nodules is represented by that

for surface sediments, it has been possible to estimate an accumulation rate of phillipsite in pelagic sediments of the Pacific of 0.02 mg/sq cm/yr. (Pulliam-Vanderbilt) W75-03615

SELENIUM BIOCHEMISTRY, National Heart and Lung Inst., Bethesda, Md. For primary bibliographic entry see Field 5C. W75-03620

ON THE SPRING MAXIMUM OF THE CON-CENTRATION OF TRACE CONSTITUENTS IN ATMOSPHERIC PRECIPITATION, Institute for Atmospheric Physics, Budapest

F. Meszaros

Tellus, Vol 26, No 3, p 402-407, 1974. 3 fig, 6 ref,

Descriptors: *Trace elements. *Precipitation(Atmospheric), *Troposphere, Gases, Calcium, Data collection, Sampling, Ions, Chlorides, Oxidation, Laboratory tests, Europe, Air pollution Identifiers: *Hungary.

A possible reaction between ozone and other trace gases was postulated on the basis of the annual variations of the concentration of different soluble components in precipitation waters collected in Hungary and in different parts of Europe. For five years, four stations installed in a rural area in Hungary collected monthly precipitation samples. Dry fallout was also included in the samples. From the samples, the pH and electrical conductivity of the water as well as the concentrations of sulfate, nitrate, ammonium, calcium and chloride ions were determined. On the basis of observations from the samples and laboratory experiments, it was concluded that stratospheric ozone plays an important part in the chemistry of tropospheric trace constituents and more exactly in the oxidation and removal of sulfur and nitrogen dioxide. (Jernigan-Vanderbilt) W75-03621

MERCURY IN TUNAS: A REVIEW.

Tropical Tuna Commission, Inter-American LaJolla, Calif. For primary bibliographic entry see Field 5C. W75-03622

THE APPLICATION OF REPRO-MODELING TO THE ANALYSIS OF A PHOTOCHEMICAL AIR POLLUTION MODEL, Technology Service Corp., Santa Monica, Calif. A. Horowitz, W. S. Meisel, and D. C. Collins. Available from the National Technical Inform tion Service, Springfield, Va. 22161, as PB-231 667, \$5.25 in paper copy, \$2.25 in microfiche. Re-port No EPA-650/4-74-001, December 1973. 99 p, 17 fig, 16 tab, 9 ref, 1 append. EPA 68-02-1207.

Descriptors: *Air pollution, *Mathematical models, *Computer programs, *California, Climatic data, Data processing, Evaluation, Analytical techniques, Ozone, Pollutants, Oxides, *Path of pollutants.

Identifiers: *Repro-modeling, Photochemical air s: 'Repro-modeling, Photochemical air, Carbon monoxide, Nitric oxide, dioxide, 'Los Angeles basin(Calif), hydrocarbons, Unreactive hydrocarpollution, Nitrogen

Several physical models which simulate the impact of emissions and meter which simulate the impact of emissions and meteorology on the creation and dispersion of photochemical smog have been developed. Characteristics of most of these models are that they are highly computational and require a great deal of input data; hence, it is generally difficult to systematically explore the implications of the models or to use them in a planning context where many model runs are

required. 'Repro-modeling' and the analysis and replication of the input/output characteristics of the model were explored as a means of meeting these objectives. A study of the applications of repro-modeling to the Systems Applications, Inc. (SAI) model developed for the Los Angeles Basin was described. The major objectives were: (1) a was described. The major objective were the major objective when the major objective were the major objective when the modeling approach; (2) a limited interpretation of the model; and (3) an efficient repro-model program which duplicates input/output relationships of the original model. The repro-model developed was analyzed in a particular application context (i.e., transportation emission control policy evaluation) and its general implications were discussed. Examples of use of the repro-model, which requires orders of magnitude less computer time than the original model, were provided. An appendix con-tains a Fortran listing of the repro-model program. (Humphreys-ISWS) W75-03633

SALTWATER INTRUSION INTO A FLOWING

Louisiana State Univ., Baton Rouge. Coastal Studies Inst. For primary bibliographic entry see Field 2L. W75-03634

GREAT LAKES WATER QUALITY, 1973 ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

International Joint Commission-United States and For primary bibliographic entry see Field 5G. W75-03640

EFFECTS OF OIL UNDER SEA ICE, Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab For primary bibliographic entry see Field 2C. W75-03646

GROUND-WATER QUALITY MODELING, New Mexico Inst. of Mining and Technology, Socorro. Dept. of Hydrology.

L. W. Gelhar, and J. L. Wilson. Ground Water, Vol 12, No 6, p 399-408, November-December 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Water quality, *Groundwater, *Water pollution sources, *Model studies, *Parametric hydrology, Water-table aquifers, Land management, Inflow, Discharge(Water), Storage, *Massachusetts, Highway icing, Deicers, Septic tanks, Nitrates, Recharge, Water balance, *Water balance, *Light Dunnit Europheimer theory, Numeri, *Vater balance, *Vate Water table, Dupuit-Forchheimer theory, Numerical analysis, Salts.

Identifiers: Lumped-parameter models, *Linear reservoirs, Phreatic aquifers.

A generalized lumped parameter groundwater model was developed based on simultaneous water and solute balances for a phreatic aquifer. The basis for the lumped parameter approach was established by comparison with theoretical analyses of water and solute dynamics in a distributed aquifer model. The basic behavior of the model is characterized by two response times, one associated with the hydraulics and the other with the solute. The model was applied to simulate the impact of highway deicing salts on groundwater quality in eastern Massachusetts. The results, obtained by digital computer simulation, were in reasonable agreement with observed trends over a 15-year period. The effects of various highway deicing alternatives were simulated and the dependence on the aquifer parameters was demonstrated. The application of this basin-wide modeling technique to the case of highway deicing salts demonstrated that this procedure can provide a reasonable basis for long-term evaluation of groundwater pollution. With adequate data on the inputs and aquifer parameters for a given locality,

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this general technique can be used to guide regulatory procedures and land use decisions that can be applied at the local, regional, or state level to pro-tect groundwater resources. (Visocky-ISWS)

HYDROCARBON DISPERSION IN GROUND WATER: SIGNIFICANCE AND CHARAC-

Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Manage-

Ground Water, Vol 12, No 6, p 427-436, November-December 1974. 6 fig, 1 tab, 6 ref.

Descriptors: *Water pollution sources, *Organic compounds, *Path of pollutants, Pollution abatement, Groundwater, Gasoline, *Oil spills, Pipelines, Storage tanks, *Pennsylvania, Water ripennes, Storage tanks, "rennsylvama, water table, "Dispersion, "Groundwater movement, Wells, Permeability, Porosity, Unconsolidated aquifers, Fractures(Geologic), Carbonate rocks, Gases, Secondary recovery(Oil), Costs, Leakage.

Groundwater contamination resulting from hydrocarbon spills is a significant problem that has received little attention. Over two hundred spills to the ground were investigated during the last two and a half years. The hydrogeologic characteristics at the spill site are critical in determining dispersion once the hydrocarbon has reached the water table. The hydrocarbon is largely contained on top of the water table. In unconsolidated deposits or in fill material, the shallow groundwater flow system and the direction of hydrocarbon dispersion will coincide. In sedimentary rocks, the orientation of the rock becomes critical. Dispersion will parallel the strike of the rock in more steeply dipping rocks rather than the major groundwater flow direction.

Lateral movement will be controlled by jointing and fracturing. Solution channels and fractures exert the major controlling influence on heavily cemented soluble limestones. In tightly cemented clastics, crystalline rocks, and less soluble carbonates, contaminants flow on top of the water table in fractures. Recovery costs for most hydrocarbon spills are expensive and complete removal is extremely time-consuming. Better maintenance and emergency response plans must be developed. (Visocky-ISWS) W75-03662

NITROGEN BUDGETS OF GREAT PLAINS IM-

POUNDMENTS,
Oklahoma State Univ., Stillwater. Dept. of Zoolo-

For primary bibliographic entry see Field 5C. W75-03758

WATER POLLUTION RESEARCH IN CANADA

Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering. For primary bibliographic entry see Field 5D. W75-03770

A STUDY OF POLLUTION LOADINGS FROM

URBAN RUNOFF, Windsor Univ. (Ontario). Dept. of Civil Engineer-

J. P. Hartt. In: Water Pollution Research in Canada 1973, Vol 8, p 16-25, 1 fig, 6 tab, 11 ref.

Descriptors: *Water pollution sources, *Urban runoff, Storm water, Winter, Flow, Annual, Phosphates, Coliforms, Biochemical oxygen de-mand, Suspended solids, Chlorides, Nitrates, Sulfates, Nitrogen.
Identifiers: *Pollution loading, Quantification, Orthophosphates.

The qualitative values, ranges of values, and mean values, on a seasonal and annual basis for 19 physical, chemical, and bacteriological parameters in urban storm water runoff at a 89-acre subdivision in Windsor, Ontario were investigated. The rainfall and runoff quantities were recorded and thence the quantities of the pollutants in pounds per acre per season were determined. To explain the reason for the great difference in pollutional loadings from season to season when rainfall and pollutant concentrations changed very little, ru-noff coefficients were calculated from rainfall records and storm runoff data collected at the site. The pollutional loadings generated by a given rainfall in a particular season probably are more significant than the concentration of a particular pollutant at a given time, in attempts to quantify the pollution reaching a receiving water on a seasonal or annual basis. The large seasonal runoff coefficient differences that occurred in this study (0.84 in winter and 0.14 in fall) is a most important factor in explaining why the winter portion of the annual pollution load is so high. It is increasingly evident that storm runoff loadings are probably greater pollution sources to receiving waters than effluents from municipal secondary sewage treat-ment plants. (See also W75-03770) (Auen-Wisconsin) W75-03772

BOUNDARY EFFECTS ON DILUTION OF

BUOYANT JETS, Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science. For primary bibliographic entry see Field 8B. W75-03780

HYDROMETALLURGY, Pennsylvania State Univ., University Park. Metallurgy and Mineral Processing Sections. For primary bibliographic entry see Field 3E. W75-03793

DETERMINATION OF MERCURY IN FLUOR-SPAR MINING SURVEY SAMPLES, British Steel Corp., Sheffield (England) For primary bibliographic entry see Field 5A. W75-03794

DETERMINATION OF MERCURY IN COM-MERCIALLY IMPORTANT AQUATIC ORGAN-

Puerto Rico Dept. of Agriculture, Santurce. R. Y. Ting, O. H. Wheeler, and E. Robles de Irizarry.

Report No COM-74-10086, January 1973. 36 p, 1 fig. 3 tab. 5 ref.

Descriptors: *Mercury, *Data collections, *Aquatic animals, *Distribution patterns, Fish, Pollutants, Invertebrates, Heavy metals, Aquatic life, Sampling, Animal physiology, Analytical techniques, *Puerto Rico, Pollutant identification, *Path of pollutants.

The levels of concentration of mercury in the flesh of the majority of fish and invertebrates com-monly taken for consumption in Puerto Rico were below the maximum permissible level set by the below the maximum permissible level set by the Federal Food and Drug Administration. However, the flesh of larger pelagic carnivorous fish such as the great barracuda, blue marlin, and kingfish often exceeded the 0.5 ppm level. The mercury concentrations in the flesh of a group of fish sampled in the same location and at the same time varied to a significant degree, but those of different permissions of the contraction of the c ferent weight classes under 400 g were not signifi-cantly different. In general, kidneys, livers and gall bladders contained higher levels of mercury gall bladders contained higher levels of mercury than flesh. Fat tissues generally contained a very low amount of mercury. Dark flesh contained lower levels of mercury than white flesh. There were indications that the fish sampled from the waters adjacent to industrial and population centers had higher levels than those sampled from relatively isolated areas; systematic sampling is required for verification. Herbivorous fish, in general, contained less mercury than carnivorous fish, in general, contained less mercury than carnivorous fish of comparable weight. (Jernigan-Vanderbilt) W75-03796

SNAIL POPULATION IN RUNNING WATER, Universidade Federal de Pernambuco, Recife (Brazil). Instituto de Biociencias. For primary bibliographic entry see Field 2I. W75-03803

EVALUATING WELL CONSTRUCTION, (PART

II), Agricultural Research Service, Beltsville, Md. E. E. Jones, Jr. Journal of Environmental Health, Vol 26, No 6, May-June, 1974. 7 p., 3 fig., 4 tab.

Descriptors: Water wells, *Groundwater, Water Descriptors: Water Wells, Groundwater, Water Pollution, Soil contamination, Sampling, Hydraulics, Boreholes, Strength of materials, Public health, Coliforms, Pesticide residues, Soils, Oil wastes, Organic wastes, Organic matter. Identifiers: *Well construction, Well bore, Contaminated wells, United States Geological Survey, State Ground Water Becauses Assets. State Ground Water Resources Agency

Information is presented on contaminant characteristics and the behavior of contaminants in soil and water. The information can help plan sampling programs to provide better information for evaluation of well construction. A good well is known by the good water of reasonably uniform quality that it produces. As no well is contaminated the same amount at all times, indication of rapid changes in water quality with time after the initiation of pumping can be used to differentiate between contamination entering the well and poor groundwater quality. Entry of the contaminant involves three factors: (1) the contaminant source, (2) a transmission path, and (3) a transmitting fluid. Many factors are involved in the residual contaminant concentration in a well water sample. Knowledge of the nature and behavior of the contaminant can provide important clues to the path of entry and aid in determining the deficiencies in the sanitary protection of the well. (Campbell-NWWA) W75-03813

MANURE STACK FLY BREEDING DEPENDS ON THE AMOUNT OF MANURE ADDED DAILY, Wisconsin Univ., Madison.

W. L. Gajmerac. Hoard's Dairyman, Vol 117, No 12, p 747, June 25,

Descriptors: *Breeding, *Farm wastes, *Waste disposal, *Waste storage, *Dairy industry, Agricultural runoff, Waste treatment. Identifiers: *Manure stock, *Flies

Identifiers: *Manure stock, *Flies.

Recent work on a 40 head Wisconsin dairy farm showed that the daily summer addition of all manure from a dairy herd will cause an increase in housefly population. To help control fly population, it is suggested that the dairymen stack all the manure during the winter and spring, hold the stacked manure until fall, then spread it and plow it under immediately. This lets the dairymen haul the manure in the fall when they have more free time and it cuts down on polluted runoff into waterways. It is believed that beneficial insects and mites inhabit the old stacks and eat the fly eggs and maggots. If only small amounts of manure are added daily during the fly breeding season these beneficial insects manage to keep fly population low. However, if large amounts of fresh manure are added daily, these insects cannot keep up with the fly reproduction. It is suggested that local health officials be contacted concerning their opinion toward flies before new manure handling facilities are developed. (Lee-East Central) W75-03815

STREAM CHEMISTRY FOLLOWING A FOREST FIRE AND UREA FERTILIZATION IN NORTH-CENTRAL WASHINGTON,

Forest Service (USDA), Wenatchee, Wash.
Pacific Northwest Forest and Range Experiment Station.

For primary bibliographic entry see Field 2K. W75-03822

PHYTOPLANKTON WHICH ARE POLLUTION INDICATORS IN LAKES, (IN SWEDISH), Vandkyalitetsinstitut, Soborg (Denmark).

K. Olrik. Vatten Vol 29, No 3, p 290-301, 1973. English sum-

Identifiers: Attheya, Ceratium-hirundinella, *Denmark(Zealand lake system), Dinobryon, Lakes, Mallomonas, Microcystis, Peridinium, *Phytoplankton, Pollution, Primary production, Seasonal, *Stephanodiscus, Synura, *Bioindicators Water allusians *Bioindicators, Water pollution sources.

A brief review is given of the methods for qualitative and quantitative investigations of freshwater phytoplankton (Nygaard's compound quotient and Utermohl's counting technique). The seasonal variation of the phytoplankton as well as the changes in quality and quantity of the phytoplankton in an alkaline lake, as a result of increasing nutrient contents of the water is illustrated by an example from a lake system in North Zealand (Denmark). The clean water diatom Attheya is the Ist to disappear, several species of the dinophycean genus Peridinium and the chrysophycean genera Dinobryon, Mallomonas, and Synura disappear next and last the dinophycean species Ceratium hirundinella disappear pears; whereas the blue-green algal genus Microcystis and the diatom genus Stephanodiscus in-crease greatly. The methods give a good supple-ment to the ecological knowledge of the lake, gained by measurements of primary production and water chemistry.—Copyright 1974, Biological Abstracts, Inc. W75-03828

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN), Kiev Inst. of Nutritional Hygiene (USSR).

Physicochemistry Lab.
N. M. Barabanova, L. R. Polishchuk, and L. A.

Stempkovskaya

Stempkovskaya.
Vopr Pitan, Vol 32, No 5, p 76-79, 1973.
Identifiers: *Ammonia, *Byproducts, Chemicals, *Chlorides, Coke, Corn(Field), *Crops, Farm, Irrigated soils, *Nitrates, Nitrites, Potatos, Soil, *Sulfates, Waste waters, Industrial wastes, Water sellution courses. nollution sources.

Potatoes and corn were grown on soil irrigated with waste waters of coke by-product plants. Both crops accumulated nitrates, ammonia, sulfates and chlorides. In the potato tubers there was a high cniorides. In the potato tubers there was a high content of monatomic phenols and nitrites. Other organic substances (sulfides, cyanides and thiocyanates) were not found in the plants, probably because of their breakdown in the soil and plants.--Copyright 1974, Biological Abstracts, Inc. W75-03846

5C. Effects Of Pollution

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLOR-

SVILLE LAKE, Kentucky Water Resources Research Inst., Lex-

L. A. Krumholz, and S. E. Neff. Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 628, \$3.75 in paper copy, \$2.25 in microfiche. Research Report No 78, October 1974. 36 p, 1 fig, 6 tab, 16 ref. OWRT B-031-KY(1), 14-31-001-3891.

Descriptors: *Suspended solids, Benthos, *Caddisflies, Aquatic insects, Drift, Sediment, *Turbidity, *Ecology, Aquatic habitats, Limnology, Water quality, Environmental effects, *Kentucky, Economics, Natural resources, Benefits, Planning, Sites, Lakes, Early impoundment, *Pre-impoundment.
Identifiers: *Salt River basin(Kent).

Permanent collecting stations have been established at 67 sites throughout the Salt River, Beech Fork, and Chaplin River drainages. Turbidities increase quickly as flow and runoff increase, and subside quickly when the rain stops. Suspended solids range up to 1,700 mg/l in high turbidities and vary considerably as a result of local spates. Water chemistry generally reflects the limestone nature of the substrate and the physico-chemical characteristics of a typically healthy limestone stream. Bottom organisms are abundant and diverse, more than 300 different benthic organisms have been identified to date. Drift samples exhibit extremely high densities ranging from 0.1 to 28 organisms percubic meter of discharge, with as many as 315,000 organisms passing the same point during peak drift activity. Species diversity of caddisflies was calculated for 85 quantitative samples. The greatest numbers emerge at dusk with sex ratios about 1:1, and with production ranging from 4.3 to 24.3 mg/sq m. The amount of land needed for a recreational area is about 4,300 acres. (Grieves-Kentucky) W75-03309

PURIFICATION OF APHANIZOMENON FLOS-AQUAE TOXIN AND ITS CHEMICAL AND PHYSIOLOGICAL PROPERTIES, New Hampistshire Univ., Durham. Dept. of Picebamistshire

Biochemistry

M. Alam, M. Ikawa, J. J. Sasner, Jr., and P. J.

TOXICON, Vol 11, No 1, p 65-72, 1973. 2 fig, 3 tab, 14 ref. OWRT A-013-NH(7).

Descriptors: Algae, *Cyanophyta, Aquatic plants, Algal poisoning, *Algal toxins, *Eutrophication, Chemical properties, Biological properties, *New Hampshire.

Identifiers: *Aphanizomenon flos-aquae, *Kezar Lake(NH).

A toxin in chromatographically pure form has been isolated from natural blooms of the bluegreen alga Aphanizomenon flos-aquae. The toxin is a strongly basin substance, which gives a posi-tive ninhydrin reaction and appears to be a guanidine derivative. A dose of 2.7 micro g in-jected intraperitoneally into 20 g mice caused death in 4.9 min. The purified toxin reversibly blocks action potentials and tension development in amphibian nerve-muscle preparations without alteration of the resting potential. The toxin differs from saxitoxin in some of its chemical and physical properties, and some of its effects on neuromuscular systems. W75-03324

SPECIFIC PRODUCTION OF AQUATIC INVER-TEBRATES,

V. E. Zaika.

V. E. ZAIKA.
Halsted Press, a division of John Wiley and Sons:
New York, NY, 1973. 154 p. Pr \$19.75.
Identifiers: Age, *Aquatic animals, Growth,
*Invertebrates, Reproduction, *Specific production, Temperature, *Productivity, Publications.

An analysis of the principles and patterns which determine the productivity level of aquatic inver-tebrate populations; the theoretical concepts and problems concerning the production process in biosystems; and the basic concepts and parameters, and mathematical expression of the basic quantities and relations between them are presented. A chapter dealing with animal growth and the relationship between growth and productivity and the correlation between maximal specific growth rates is included. A chapter on methods for calculating the production of animal populations, production of microorganisms and production of multi-cellular animals is represented. The 4th chapter discusses productivity of infusorians. The specific production of rotifers, annelids and monogenetic trematodes, crustaceans, aquatic larvae, insects, mollusks and echinoderms is dealt with. Comments are given on the results of the author's own investigations into principles determining the specific production of the population. An extensive list of references is included.--Copyright 1974, Biological Abstracts, W75-03327

EPIDEMIOLOGIC RELATIONSHIPS BETWEEN HUMAN AND ANIMAL SAL-MONELLA CARRIERS AND THEIR ENVIRON-MENT IN THE SWISS REGION OF THE LAKE OF CONSTANCE, (IN GERMAN), Institut fuer Medizinisches Mikrobiologie Kantons

Sankt Gallen (Switzerland). S. Pagon, W. Sonnabend, and U. Krech.

Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 158, No 5, p 395-411, 1974. English summary.

Identifiers: Carriers, Environment,
*Epidemiologic studies, Germany, Gulls, Lakes,
Pollution, *Salmonella, Salmonella-bareilly, Salmonella-manchester, Sea, Sewage, Soil, Turtles, Vectors, *Switzerland(Lake of Constance), Waste

In a 2-yr epidemiologic investigation (1969-1970) a correlation was demonstrated between salmonellae found in sewage in St. Gall and 59 registered human Salmonella excreters. With the exception of Salmonella bareilly, the Salmonella serotypes and phagotypes isolated from these patients were also isolated from sewage. In some cases, a relationship existed between Salmonella isolated from sewage and from certain animal excreters (seagulls and turtles) and foodstuffs. Of 46 different Salmonella serotypes demonstrated in sewage, 26 originated from these sources. The role of sea-gulls as a Salmonella vector on the shore of the Lake of Constance and the near vicinity was investigated. From 3 landings on the Lake of Constance (Romanshorn, Arbon and Rorschach) 996 samples of sea-gull droppings were collected and examined bacteriologically; 6.9% of the samples were positive for Salmonella. The seasonal migration of sea-gulls suggests that S. manchester was introduced from the coastal region of Northern Germany. Examination of sludge and clarified sewage water from the drainage systems of sewage treatment plants in St. Gall showed that neither an out-dated and over-worked sewage treatment plant nor a modern sewage treatment plant was able to remove the Salmonella from sewage. Salmonellae were returned to the environment in the clarified sewage water and in the sludge which was used as fertilizer.--Copyright 1974, Biological Abstracts, Inc. W75-03330

INFLUENCE OF SALINITY ON THE EGGS AND LARVAE OF THE CALIFORNIA KILLI-FISH FUNDULUS PARVIPINNIS, Fisheries Research Board of Canada, Nanaimo

(British Columbia). Biological Station.

Mar Biol (Berl), Vol 24, No 2, p 155-162, 1974. Identifiers: *California killifish, Colonization, Eggs, Freshwater fish, Fundulus-parvipinnis, Larvae, Optimum, Physiological studies, *Salinity, Water pollution effects.

Incubation salinities over the range of 5-14% S (salt water) produced the shortest incubation period, maximum volk-conversion efficiency, lar-

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gest larval size at hatching and maximum viable hatch. Various morphometric measurements of the newly-hatched larvae were influenced significantly by incubation salinity. Fertilization salinity also affected certain development criteria; in general, lower fertilization salinities resulted in shorter incubation periods and larger larvae at hatching. A salinity range of 5-14% S is suggested as a physiological optimum and the known freshwater affinity of the species suggests that an eventual freshwater colonization by the California killifish is possible.--Copyright 1974, Biological Abstracts, Inc.
W75-03334

STUDY OF THE HYDROGRAPHIC AND CHEMICAL CONDITIONS IN THE WATER OF THE LAGOON OF TACARIGUA, (IN SPANISH), Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
For primary bibliographic entry see Field 5B.

W75-03335

W75-03393

COMMERCIAL OYSTER FISHERY DEVELOP-MENT INVESTIGATION,

Hawaii State Dept. of Land and Natural Resources, Honolulu.

For primary bibliographic entry see Field 6C. W75-03350

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES, Mote Marine Lab., Sarasota, Fla. For primary bibliographic entry see Field 5G.

THE ENTERPRISE, WISCONSIN, RADIATION FOREST - PREIRRADIATION ECOLOGICAL STUDIES.

Atomic Energy Commission, Washington, D.C. Available from the National Technical Information Service, Springfield, Va. 22161, as Rept No TID-26113, \$7.60 in paper copy, \$2.25 in microfiche. TID-26113, June 1974. 157 p, 90 fig, 73

Descriptors: *Forests, *Great Lakes region, *Wisconsin, *Radioactivity effects, Genetics, Research and development, Research facilities, *Cesium, Populations, Animals, Plants, Census, Plant growth, Animal growth, Litter, Leaves, Density, Canopy, Biological communities, Survevs.

Identifiers: *Gamma radiation, *Enterprise radiation forest.

The research on which the papers in this volume are based is an expansion of radiation studies begun at the Institute of Forest Genetics in 1961. The information to be obtained would complement radioecological results obtained in studies of other types of forests, such as those on Long Island and in Puerto Rico. Plans were developed for a research program to extend over a 20-year period and to include irradiation of various northern forest types during different seasons of the year, as well as a 5-year exposure of one of the major northern forest types, namely, aspen. The papers in this volume are concerned with preirradiation studies on the first site chosen for irradiation. The information is largely descriptive of the physical and biological environments of the Enterprise Radiation Forest and is intended to supply reference and base-line information not only for evaluating the gamma-radiation impact but also on the ecology of some important northern forest types. (See W75-03402 thru W75-03414) (Houser-ORNL) W75-03401

THE ENTERPRISE RADIATION FOREST RESEARCH FACILITY,
Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station. T. D. Rudolph.

In: The Enterprise, Wisconsin, Radiation Forest-Preirradiation Ecological studies, Report No TID-26113, p 1-16, June 1974. 14 fig, 1 tab, 10 ref.

Descriptors: *Forest management, *Ecology, *Radiation, *Radioactivity effects, *Cesium, Research and development, Research facilities, *Forest management, *Ecology, Natural resources, Great Lakes region, Irradiation, Genetics, Sites, Locating, Mapping.

1440-acre forest in northern Wisconsin which is being used for gamma-irradiation studies on various northern forest communities is described. A brief history of the area, which is typical of much of the upper Great Lakes forest region, is presented together with a description of its current condition. Development of the tract into a radia-tion research facility is described. A 10,000-Ci Cs-137 radiation source was used. Studies on each radiation site will include characterization of the pre-irradiation communities, changes occurring during irradiation, and postirradiation recovery. (See also W75-03401) (Houser-ORNL) W75-03402

DESCRIPTION OF EXPERIMENTAL PLOT DESIGN OF SITE 1 AND THE CONTROL

AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.

B.J. Salmonson, R. W. Blank, and R. L. Nelson.

In: The Enterprise, Wisconsin, Radiation Forest Preirradiation Ecological Studies, Report No TID26113, p 17-31, June 1974. 20 fig, 5 ref.

Descriptors: *Sites, Locations, *Explorations, *Habitats, *Radioactivity effects, *Mapping, Stations, *Phenology, Zoning, Management, Topography, Control, Forest management, Vegetation, Mammals, Soils, Climatology, Measurement, Sampling, Radioactivity, Meteorology, Rainfall.

Initial studies in the Enterprise Radiation Forest were begun in 1968, and the locations of radiation site 1 and the control area were selected in July 1969. Once the location of site 1 was determined, work was immediately begun to establish transects and sampling plots in site 1 and the control area. Weather stations established in 1968 have maintained since that time. During August 1969 the ground vegetation was sampled and the species were identified. Also at that time the trees numbered, measured for diameter at breast height, and identified. In June 1970 the exact locations of the trees relative to the center of site I were deter-mined by transit. Small mammal trapping grids were also established in the spring of 1970, and a systematic live-trapping schedule was initiated. The dosimetry design was formulated in 1971, and the field work was completed early in 1972. A detailed description of the methods used in establishing the experimental-plot design in site I and the control area is presented. (See also W75-03401) (Houser-ORNL) W75-03403

SOLAR RADIATION MEASUREMENTS IN THE ENTERPRISE RADIATION FOREST,
Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station. J. Zavitkovski.

In: The Enterprise, Wisconsin, Radiation Forest Preirradiation Ecological Studies, Report No TID-26113, p 33-45, June 1974. 6 fig, 7 tab, 19 ref.

Descriptors: *Forest management, Research and development, Radioactivity, *Radioactivity effects, Measurement, Genetics, *Birch trees, *Maple trees, *Solar radiation, Light, Meteorolo-Hardwood, Canopy, Trees, Ecology, Identifiers: *Aspen trees.

Solar radiation was measured in the open and under canopies of several forest types in northern Wisconsin by means of a recording pyranograph and petroleum-ether chlorophyll extracts. Cumula-tive solar energy in the open was substantially higher in the generally sunny period from April to November 1970 than in the same period in 1971 and 1972, which in both years was cloudy. Depending on cloudiness, the average daily maxima may occur in May (471 langleys in 1972), June (441 langleys in 1971), or July (577 langleys in 1970). Compared with published averages for the Midwest, the measured solar energies were low, probably because of the excessive cloudiness in the Great Lakes region. The highest solar energies under canopies were determined in the aspen forest, followed in decreasing order by birch, maple-aspen-birch, and northern hardwood forest types. Highest absolute solar energies, about 2800 to 3000 langleys/month (or about 20 to 23% of the to 3000 langleysmonth for about 20 25% of the energy in the open), were determined in all four forest types in May, but relatively more energy (27 to 36%) reached the forest floor in November under leafless canopies. Very low relative values of 2.1, 3.2, 4.2, and 5.9% of the energy in the open were measured under canopies in leaf in the northern hardwood, maple-aspen-birch, birch, and aspen forest types, respectively. (See also W75-03401) (Houser-ORNL) W75-03404

LICHENS OF THE ENTERPRISE RADIATION

Michigan Technological Univ., Houghton. F. H. Erbisch.

In: The Enterprise, Wisconsin, Radiation Forest-Preirradiation Ecological Studies, Report No TID-26113, p 47-53, June 1974. 10 fig, 3 tab, 14 ref.

Descriptors: *Forest management, Radioactivity, *Radioactivity effects, *Genetics, *Lichens, *Fungi, Sessile algae, Irradiation, Damages, Measurement, Plant growth, Environmental effects, Temperature.

The effects of both environmental change and gamma radiation on lichen thalli in their native habitats are questionable. This study attempts to determine both the macro- and microscopic effects of these two factors on lichen thalli at the Enterprise Radiation Forest. Measurements and observations of thallus growth, configuration, and coloration; substrate temperature; thallus internal structure; and transplanted thalli are being made before irradiation for comparison with measurements and observations after the radiation treatment. The drastic environmental change caused by irradiation of the higher plants and their subirradiation of the higher plants and their sub-sequent death or growth retardation will also af-fect the lichens. Which will have the greater effect and what the combined effect will be is to be deter-mined. (See also W75-03401) (Houser-ORNL) W75-03405

FLORA OF THE ENTERPRISE RADIATION FOREST

Nicolet Coll.-Technical Inst., Rhinelander, Wis.

In: The Enterprise, Wisconsin, Radiation Forest -Preirradiation Ecological Studies, Report No TID-26113, p 55-61, June 1974. 2 tab, 3 ref.

Descriptors: *Forest management, *Ecology, Radioactivity, *Radioactivity effects, *Vascular tissues, Plant morphology, Vegetation establishment, Varieties, Genetics, Vegetation, *Plant groupings.

The 193 vascular plant species recorded in the En-The 193 vascular plant species recorded in the Enterprise Radiation Forest are listed. Information on Longevity, abundance, and existence of voucher specimen is given for each species. The gound-cover flora of this forest most closely resembles that of the Wisconsin northern drymesic type described by Curtis (1959). The 193 species recorded within the transects of site 1 of

Effects Of Pollution-Group 5C

the radiation area are listed. (See also W75-03401) (Houser-ORNL)

DESCRIPTION AND CLASSIFICATION OF PLANT COMMUNITIES IN SITE 1 AND THE CONTROL AREA, Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station.

I. Zavitkovski.

In: The Enterprise, Wisconsin, Radiation Forest -Preirradiation Ecological Studies, Report No TID-26113, p 63-84, June 1974. 1 fig, 23 tab, 13 ref.

Descriptors: *Forests, *Radioactivity effects, *Genetics, *Speciation, *Varieties, Surveys, Ecology, Sampling, Sites, Plant groupings, Biological communities, Plant growth, Forecasting, Projections, Birch, Density, Population.
Identifiers: *Aspen.

Nine forest and three logging-road plant communi-ties were sampled in the Enterprise Radiation Forest in northern Wisconsin. These communities were quantitatively described by simple ecological indicators - frequency, density, and basal area or cover - and were classified by comparing them to standard cover types of three classification systems. Three forest communities were similar to the aspen cover type, three others to the aspen-paper birch cover type, and one each to the paper birch and sugar maple-basswood cover types. One community was transitional. Seven of the nine communities were in early and two in more-advanced successional stages. Paper birch, red and sugar maple, and quaking aspen headed the list of important species, followed by beaked hazel, Carex pensylvanica, and large-leaved aster. Among the top 23 species were 11 trees, 2 shrubs, and 10 herbs. The future composition of the nine stands is predicted on the basis of the relative representation of young tree, sapling, and tree-seedling species. (See also W75-03401) (Houser-ORNL) W75-03407

PHYSICAL CONDITION AND DIMENSIONS OF TREES IN SITE 1 AND THE CONTROL AREA, Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.

J. Zavitkovski.

In: The Enterprise, Wisconsin, Radiation Forest -Preirradiation Ecological Studies, Report No TID-26113, p 85-95, June 1974. 23 fig, 6 tab, 11 ref.

Descriptors: *Forests, Ecology, Radioactivity, *Radioactivity effects, *Trees, *Surveys, *Measurement, Physical properties, Size, Dimensions, Graded, Shape, Research and development, Biological communities.

Physical conditions of trees composing nine forest communities of the Enterprise Radiation Forest are described and relationships between their age, size, and crown dimensions are established. The trees, mostly of vegetative origin, were reasonably healthy and free of serious mechanical damage. They varied widely in age, size, and crown dimensions, but for individual species good relationships existed among these variables. The trees and the nine forest stands provide suitable and biologically interesting study material for a pilot study on the effects of ionizing radiation on natural forest ecosystems. (See also W75-03401) (Houser-ORNL) W75-03408

PROPERTIES OF THE TREE FLORA IN THE FOREST TRANSITION FROM ASPEN TO

MAPLE-BIRCH TYPE,
Michigan State Univ., East Lansing.
P. G. Murphy, and R. R. Sharitz. Proc. Mulphy, and K. R. Shantz.
In: The Enterprise, Wisconsin, Radiation Forest Preirradiation Ecological Studies, Report No TID26113, p 97-104, June 1974. 4 fig, 6 tab, 12 ref. Descriptors: *Forests, Ecology, Biological communities, *Canopy, Trees, *Aspen trees, Ecological distribution, Comparative productivity, *Birch rees, *Maple trees, Environmental effects, Foliar, Radioactivity effects, Mortality, Epidemiology, Forecasting, Projections.

Five belt transects were used to study certain properties of the tree flora in a zone of transition between an aspen-dominated area and a maplebirch-dominated area in the Enterprise Radiation Forest. The properties studied included tree-species composition of the canopy, sapling, and seedling strata; population densities; species importance values; species diversity; and leaf-area index. On the basis of known ecological characteristics of the dominant species, leaf-area index. species diversity, and an analysis of similarity between canopy and understory three-species composition, the ecotone appears to include forest types representing three stages of maturity, from the least mature aspen area to the most mature, although still successional, maple-birch area. Because of a complicated and undocumented history of disturbance in the area, the ecotone is not assumed to represent a typical forest sere for undisturbed succession at the Enterprise site. It is predicted that the aspen area will experience the greatest aboveground tree mortality in response to chronic gamma irradiation but that this area will also be the quickest to recover to an approximate preirradiation condition. The overall ecological effect in all areas along the transition will be a setback in successional status, which will be evidenced by changes in the parameters documented in this study. (See also W75-03401) (Houser-ORNL) W75-03409

PREDICTED EFFECTS OF CHRONIC GAMMA IRRADIATION ON NORTHERN FOREST COM-MUNITIES, Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station.

J. Zavitkovski, T. D. Rudolph, and E. O. Bauer. In: The Enterprise, Wisconsin, Radiation Forest -Preirradiation Ecological Studies, Report No TID-26113, p 137-144, June 1974. 7 tab, 30 ref.

Descriptors: Radioactivity effects, *Forecasting, Biological communities, *Radiation, *Cesium, Genetics, *Forests, *Plant growth, *Great lakes region, Environmental effects, Vegetation, Trees, Density, Population, Census, Shrubs, Damages, Ecosystems, Chromosomes, Cytological studies, Revegetation.
Identifiers: *Radioactivity damage.

A prediction of the effects of gamma radiation (growing-season exposure) on natural northern forest communities has been developed based on vegetation survey, determination of interphase chromosome volumes (ICV) of the most important plant species, and reported relationships between ICV and radiosensitivity. The ICV's of angiosperm tree, shrub, and ground-vegetation species ranged from about 1.5 to 7.3 cubic micron, and those of gymnosperm trees from 30.2 to 52.0 cubic more of gymnosperm trees from 50.2 to 32.0 countermore on Lichens and bryophytes are common and because of their high radio-resistance should survive in the innermost zone. A Carex zone with some Lycopodiaceae should develop around this innermost zone; this should be followed by a zone dominated by Corylus cornuta and several species of Ericaceae. The transition between the third and fourth zone may be very diverse, with Corylus and Amelanchier, some Polypodiaceae, and perhaps some resistant tree genera such as Tilia, Fraxinus, and Prunus. (See also W75-03401) (Houser-ORNL) W75-03410

TEMPORAL AND SPATIAL PATTERNS OF PRETREATMENT LITTER PRODUCTION IN SITE 1 AND THE CONTROL AREA, Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station.

T. R. Crow

In: The Enterprise, Wisconsin, Radiation Forest -Preirradiation Ecological Studies, Report No TID-26113, p 105-113, June 1974. 7 fig, 7 tab, 6 ref.

Descriptors: *Litter, *Forests, *Genetics, Ecology, *Trees, *Temporal distribution, *Ecological distribution, *Leaves, Migration patterns, Distribution, Spatial distribution, Radioactivity ef-Identifiers: *Litter fall.

Between August 1969 and May 1972, year-round collections of litter fall were obtained in aspen, birch, and northern hardwood communities in site 1 and similar communities in the control area of the Enterprise Radiation Forest. In both areas total litter production was greatest in the northern hardwood forest type, intermediate in birch, and lowest in aspen. The differences proved statistically significant in the control area but not in site 1. Differences among years were also significant in terms of total litter production but were not significant for leaf-litter production. Because of its spatial and temporal (on an annual basis) uniformity relative to other litter components, leaf litter should provide the best indicator of perturbation related to chronic gamma irradiation. (See also W75-03401) (Houser-ORNL) W75-03411

LEAF-LITTER PRODUCTION IN THE ASPEN AND MAPLE-BIRCH FOREST TYPES AND THE CONTRIBUTION BY INDIVIDUAL TREE SPE-

Michigan State Univ., East Lansing. P. G. Murphy, R. R. Sharitz, and A. J. Murphy. In: The Enterprise, Wisconsin, Radiation, Forest Preirradiation Ecological Studies, Report No TID-26113, p 115-118, June 1974, 1 fig. 3 tab, 9 ref.

Descriptors: *Litter, Leaves, *Productivity, Annual turnover, Comparative productivity, *Maple trees, *Birch trees, *Radioactivity effects, Ecology, Canopy, Biomass, Speciation, Biological com-munities, Environmental gradient, Latitudinal studies, Dominant organisms, Ecotypes. Identifiers: *Aspen trees, *Leaf-litter, Foliage.

Immediately following leaf fall in 1971, leaf-litter samples were collected from two forest types. aspen and maple-birch, and from an intervening zone of transition. Only leaves that fell in 1971 were collected. Leaf-litter fall for trees averaged 134 kg/m sq of basal area in the aspen area and 142 kg/m sq in the maple-birch area. Total tree and shrub leaf-litter fall was estimated to be 2.32 tonnes/ha in the aspen area and 2.63 tonnes/ha in the maple-birch area. Shrub leaf-litter fall was greatest in the aspen area, 5.4% of total leaf-litter fall. The relation between relative basal area and relative leaf-litter biomass for tree species was ap-proximately 1:1. Diversity values computed on the basis of number of leaves per species or on biomass of leaves per species indicated that the maple-birch foliage was not diverse and the aspen foliage least diverse. (See also W75-83401) (Houser-ORNL) W75-03412

VERTERRATES OF THE ENTERPRISE FOREST: A GENERAL SURVEY,
Forest Service (USDA), Rhinelander, Wis. North

Central Forest Experiment Station.

In: The Enterprise, Wisconsin, Radiation Forest-Preirradiation Ecological Studies, Report No TID-26113, p 119-122, June 1974. 5 tab, 4 ref.

*Animal populations, *Surveys, Descriptors: *Census, *Wildlife, *Forests, Genetics, Amphibians, Reptiles, Birds, Mammals, *Radioactivity ef-Research and development, Ecology, Morbidity, Ecosystems, Speciation, Nests, Habitats, Wildlife habitats, Behavior. Identifiers: *Vertebrates, Aves.

Group 5C-Effects Of Pollution

Studies of the effects of gamma radiation on northern forest ecosystems are in progress at the Enterprise Forest in northern Wisconsin. A separate species list is presented for four classes of vertebrates, Amphibia, Reptilia, Aves, and Ammalia, found in the radiation forest. The lists will benefit people with specific interest in suitable study material for subsequent radiation experiments as well as those with a general interest in the vertebrate fauna of the area. The lists range from accurate for mammals to incomplete for avian forms. (See also W75-03401) (Houser-ORNL) W75-03413

SMALL-MAMMAL POPULATIONS IN SITE 1

AND THE CONTROL AREA,
Forest Service (USDA), Rhinelander, Wis. North Central Forest Experiment Station. R R Buech.

In: The Enterprise, Wisconsin, Radiation Forest Preirradiation Ecological Studies, Report No TID-26113, p 123-135, June 1974. 4 fig, 3 tab, 28 ref.

Descriptors: *Small animals(Mammals), *Census, *Mammals, *Small game, *Wildlife, Animal groupings, Animal populations, *Cesium, *Radioactivity effects, Ecology, Genetics, Biological communities, Distribution patterns, Trapping, Reproduction, Animal physiology, Weight, Mortality, Breeding, Snow cover.

A live-trap study of small-mammal populations and their response to gamma radiation is in progress in the Enterprise Radiation Forest near Rhinelander, Wisconsin. Trapping in northern forest communities has been conducted on a monthly basis since May 1970, along two grids totaling 8.9 ha in size. Data gathered from the two grids before radiation treatment were combined to grass before radiation treatment were combined to present information concerning the trappability, populations, reproduction, and body weight of the most prominent species. Species studied are the red-backed vole (Clethrionomys gapperi), the short-tailed shrew (Blarina brevicauda), the eastern chipmunk (Tamias striatus), the meadow vole (Microtus pennsylvanicus), the woodland deer mouse (Peromuscus maniculatus gracilis), and the white-footed mouse (P. leucopus). (See also W75-03401) (Houser-ORNL) W75-03414

TRANSURANIC SOLID WASTE MANAGE-MENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974. Los Alamos Scientific Lab., N. Mex.

For primary bibliographic entry see Field 5A. W75-03420

TEMPERATURE **EFFECT** ON BRAIN

GLYCOGEN OF FISH, Universitaet Hohenheim (Landwirtschaftliche Hochschule) (West Germany). Zoological Inst.

H. Breer, and H. Rahmann. Brain Research, Vol 74, No 2, p 360-365, July 12,

Descriptors: Investigations, *Temperature, *Fish physiology, *Thermal stress, Seasonal, *Water pollution effects, Water temperature. Identifiers: *Goldfish, Brains, Livers, Fish CNS, Glycogen levels.

Investigations were undertaken to determine possible seasonal changes of the concentration of brain glycogen and to study the influence of temperature, one of the critical factors in the life of aquatic poikilotherms, on the glycogen metabolism and fish CNS. The experiments were performed on Scardinus erythrophtalmus and on Carassius auratus. Results show that there are very different responses of both brain and liver organs under thermal stress. In the liver, glycogen levels are constant, whereas in the brain, glycogen levels are influenced by the water temperature. Also, the intensified accumulation of glycogen in cold-acclimatized goldfish brains is an adaptation process which starts immediately after the temerature changes; it is particularly intensive during the first hours but can be observed for over several weeks. Contrary to the results of the experimental temperature test, under natural condi-tions there was an accumulation of glycogen, in brain as well as in liver, during cold seasons. It could not be shown from these findings which sub-cellular compartments are responsible for the in-creased glycogen storage in the cold. (Sandoski-W75-03447

SUBACUTE TOXICITY OF METHYLMERCU-RY IN THE ADULT CAT, Food and Drug Directorate, Ottawa (Ontario). Food Research Labs.

S. M. Charbonneau, I. C. Munro, E. A. Nera, R. F. Willies, and T. Kuiper-Goodman.

Toxicology and Applied Pharmacology, Vol 27, No 3, p 569-581, March, 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Toxicity, *Mercury, Fish, *Canada, Pollution, Animal pathology, Food chains, Fish dieases, Water pollution effects.

Identifiers: *Cats, *Methylmercury, Methylmer-

curic chloride.

Some species of edible fish from Canadian waters contained hazardous levels of methylmercury. A guideline for sale of fish was set at 0.5 ppm Hg. Since fish represents the major source of dietary methylmercury, studies for assessing toxicity of fish in polluted waters were conducted. Cats were used because their clinical and pathological features are similar to humans who consumed toxic quantities of food containing methylmercury. A dose of 0.25 mg Hg/kg/day was administered to two groups of cats for 12-14 weeks, either as pure methylmercuric chloride or as methylmercury-contaminated fish. A control group received a diet containing uncontaminated fish. Clinical signs of methylmercury intoxication consisting of ataxia, intention tremor and impaired righting reflex and convulsions developed between 55 and 96 days in both treated groups, at which time the total dose received was between 14 and 24 mg Hg/kg. Tissue mercury content was similar in both groups of treated animals, as were the pathologic changes. Lesions were found in the cerebellar vermis and the cerebral cortex. The changes consisted of loss of nerve cells with replacement by reactive and fibrillary gliosis. Chromosome studies of terminal bone marrow samples showed no abnormalities. (Prague-FIRL) W75-03448

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.

Illinois Inst. for Environmental Quality, Chicago. Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as PB-229 500, \$3.75 in paper copy, \$2.25 in microfiche. Report IIEQ 74-5, January 1974. 39 p, 2 fig, 7 tab, 54 ref.

Descriptors: *Nitrates, *Evaluation, *Illinois, *Water pollution effects, *Water supply, Planning, Environmental effects, Water quality, Water pollution sources, Water policy, Water pollution, Municipal water, State governments, Water demand, Water pollution control, Water quality standards, Water treatment, Water pollu-tion treatment, Water quality control, Water supply development, Water manage-

supply development, Water manage-ment(Applied), Water allocation(Policy). Identifiers: "Hazardous substances(Pollution), Non-point sources(Pollution), Environmental policy, State policy.

Possible adverse health consequences of continued use of waters with elevated nitrate levels as drinking water supplies are discussed. Data gathered by the Illinois Environmental Protection Agency indicated that several surface water supplies and public well water supplies in Illinois had often exceeded the U.S. Public Health Service Drinking Water Standard for nitrates. The following recommendations were made: (1) The present limit of 10 ppm nitrate-nitrogen should be main-tained. (2) Certain populations which might be more susceptible to the effects of elevated nitrate levels than the average population should be pro-tected. (3) Epidemiologic studies should be un-dertaken. (4) Research into the reactions with other substances in the water should be un-dertaken. (5) Available treatment methods for the removal of nitrates from water supplies should be used. (Deckert-Florida) W75-03484

ACCUMULATION, DISTRIBUTION, TRANS-FORMATION AND ELIMINATION OF DDT-14C IN SOLEA SOLEA (PISCES: SOLEIDAE). (IN

Institut fuer Meeresforschung, Bremerhaven (West Germany).

W. Ernst, and H. Goerke. Mar Biol (Berl), Vol 24, No 4, p 287-304, 1974, Illus.

*Distribution, *Insecticides, Pisces, *Solea-solea, Soleidae, Transformation, *Absorption.

Common soles S. solea (L.) are extremely suitable for studying the fate of pesticides in marine fish by means of laboratory experiments involving smallmeans of laboratory experiments involving small-sized, accurately controlled, closed aquarium systems. In 5 different experiments on 16 fishes the decreasing accumulation percentages with in-creasing doses, i.e., with longer application periods, were found to be due to elimination dur-ing the application period. During a period of 2 mo. in pesticide-free water, S. solea eliminated 62% of the DDT-LICC which it had accumulated effect food. the DDT-14C which it had accumulated after feeding with 17 micrograms DDT-14C over a period of 4 wk. The gastrointestinal tract is assumed to be a major route of DDT elimination. Independent of dosage, there was a characteristic distribution pattern of accumulated DDT: brain, liver and gastrointestinal tract ranked highest, while the concen-tration in skeletal muscle was lowest. Even during the elimination period the pattern was unchanged. DDE, DDD and a polar component occurred as metabolites, but in all organs more than 80% of the accumulated DDT remained unchanged. Percentages of metabolites were high in liver and gastro-intestinal tract than in skeletal muscle. Prolonged exposure to DDT in the diet induced DDT transformation in the gastro-intestinal contents, most probably in the bacterial flora of the gut.—Copyright 1974, Biological Abstracts, Inc. W75-03494

ORGANOCHLORINE INSECTICIDE RESIDUES IN SEDIMENT AND FISH TISSUES, ONTARIO,

CANADA,
Ontario Ministry of Agriculture and Food, Guelph.
Pesticide Residue Lab.

R. Frank, A. E. Armstrong, R. G. Boelens, H. E. Braun, and C. W. Douglas. Pestic Monit J, Vol 7, No 3/4, p 165-180, 1974,

Illus.
Identifiers: Biological studies, *Canada(Ontario),
Chlorodiphenyl, DDE, *DDT, *Dieldrin, Ethane,
*Insecticides, Invertebrates, Plankton, Sediments,
Soils, *Pesticide residues, *Fish tissue, Lake sedi-

River and lake sediments and several species of fish were collected from 4 study areas in the Province of Ontario. These consisted of 1 agricultural, 2 mixed agricultural-recreational, and 1 recreational study area. Large volumes of DDT and dieldrin were used in the 1st area, small quantities were used in the mixed areas, and insignificant quantities were used in the recreational area. The agricultural and mixed areas were located on deep alluvial soils; the recreational area was located on bare-to-thinly-covered Precambrian

Metabolites, DDE and (tetrachlorodiphenylethane) were predominate over the parent DDT. Residues of DDT and dieldrin in fish tissues tended to depend on feeding habits, fat content and age of the fish. Residues increased in the low-fat piscivores, were slightly higher in the high-fat feeders, and were highest in the high fat piscivores. The concentration of DDT and dieldrin in the tissues and extractable fat and the actual quantity accumulated per fish increased as size and weight of any 1 species increased. The increase in total DDT or dieldrin concentration from lowest to highest tissue residues of all fish species was of the order of 100-500 times; the increase in body load was of the order of 1000-10,000. Higher concentrations in fish tissue were correlated with the higher sediment levels of the Precambrian recreational area. The use of even minute quantities of persistent chlorinated hydrocarbons in rocky Precambrian watersheds has a profound effect on sediment and biota contaminants.—Copyright 1974, Biological Abstracts, Inc. W75-03495

CADMIUM UPTAKE BY WHEAT FROM SEWAGE SLUDGE USED AS A PLANT NUTRIENT SOURCE: A COMPARATIVE STUDY USING FLAMELESS ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS

Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5A.
W75-03503

DATA ON SUBSTANTIATION OF THE MAX-IMUM ALLOWABLE CONCENTRATION OF BUTYPHOS IN WATERS, (IN RUSSIAN), Uzbekskii Nauchno-Issledovatelskii Institut

Uzbekskii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent

Yu U. Khasanov, and R. A. Akhmedova. Gig Sanit, Vol 38, No 8, p 92-93, 1973.
Identifiers: Blood, *Butyphos, Cholin, Esterase, Guinea-pig, Liver, *Maximum allowable concentration, Mouse, Rabbit, Rat, Taste, Tests, *Lethal limit, *Toxicity, Water pollution effects, Organoleptic properties.

The toxicity of this defoliant was determined on white mice, rats, guinea pigs and rabbits with a single administration into the gastrointestinal tract. Its cumulative properties, cholinesterase activity in the blood and biochemical indices characterizing liver function were investigated. On the basis of its weak cumulative properties and the large gap between the toxicological threshold dose and the threshold concentration with respect to the taste of water (about a million-fold), 0.0003 mg/l was taken as the maximum allowable concentration in bodies of water on the basis of an organoleptic index of acceptability .-- Copyright 1974, Biological Abstracts, Inc. W75-03505

PHYSIOLOGICAL EFFECTS OF A SUBLETHAL CONCENTRATION OF PHENOL IN THE PIKE (ESOX LUCIUS L.) IN PURE BRACKISH WATER, Helsinki Univ. (Finland). Dept. of Zoology.

R. Kristoffersson, S. Broberg, and A. Oikari. Ann Zool Fenn, Vol 10, No 2, p 392-397, 1973, Illus.

Identifiers: Amino acids, Brackish water, Metabolism, *Phenols, Physiological studies, *Pikes, *Sublethal limit, Water pollution effects,

The effect of phenol on pike (E. lucius) living in brackish water of relatively stable salinity, 5-6%, was studied in continuous-flow aquarium experiments. The highest concentration for surviva at least 1 wk was 5 ppm of phenol at a water tem-perature of 10C. Longer periods were not tested.

This concentration produced the typical effects of phenol on activity, which lasted for the 1st 2-3 days. After 1 wk exposure the test fish were still in good condition, as judged from their external ap-pearance. No differences could be demonstrated between the control and phenol-affected groups in blood Hb, hematocrit, total plasma protein, Na+, K+, Ca2+, Mg2+ or Cl- values. The total amount of plasma free amino acids was slightly increased in the phenol-affected group. Significant changes in individual amino acids are reported but their value as indicators of phenol action remains obscure. No clearly destructive histopathological changes in the gill lamellae or liver structures of the phenol-affected group could be detected.— Copyright 1974, Biological Abstracts, Inc. W75-03507

ACCUMULATION EXPERIMENTS WITH LIN-DANE IN A CULTURE OF DUNALIELLA FOR STANDARDIZATION OF AN ALGAE TEST. (AKKUMULATIONSVERSUCHE VON LINDEN IN EINER KULTER VON DUNNALIELLA SPEC. ZUR STANDARISIERUNG EINES AL-

Hamburg Univ. (West Germany). Institut fuer Hydrobiologie und Fischereiwissenschaft. K. Lillelund, and L. Wehrmann.

Berichte der Deutschen Wissenschaftlichen Kommission fur Meeresforschung, Vol 23, No 3, p 317-325, 1974. 6 fig, 7 ref.

Descriptors: *Food chains, *Pesticide residues, Pesticides, *Algae, Path of pollutants, Standards, Plankton, Biomass, Water quality standards, Tests, Absorption, Water pollution effects, Pollutant identification.

*Lindane, Identifiers: *Bioaccumulation,

Experiments were made with Lindane in a standing water culture of Dunaliella to develop a standard test for the accumulation of pesticides in marine food chains. The degree to which the level of accumulation depends on the pesticide concentration in the culture medium and on the density of cells was determined. (Katz) W75-03508

OF 2-(DIGERANYLAMINO)-TOXICITY ETHANOL, A CANDIDATE SELECTIVE FISH

TOXICANT,
Bureau of Sport Fisheries and Wildlife, La
Crosse, Wis. Fish Control Lab.

L. L. Marking. Transactions of the American Fisheries Society, No 4, p 736-742, 1974. 1 fig, 8 tab, 21 ref.

Descriptors: *Toxicants, *Selectivity, *Toxicity, *Bioassay, *Carp, *Temperature, *Fish control agents, Bass, Sunfishes, Laboratory tests, Warmwater fish, Cold-water fish, Hydrogen ion concentration, Hardness(Water), Invertebrates, Sal-

Identifiers: 2-(Digeranylamino)-ethanol, Selective toxicants, Micropterus dolomieui, Lepomis macrochirus, Lepomis cyanellus, Carassius au-

The chemical, 2-(digeranylamino)-ethanol, was tested in the laboratory and in outdoor plastic pools to determine the toxicity to a variety of coldand warm-water fish. An interesting aspect is that the toxicant is more toxic to carp than to other warm-water fish. The 96-hr LC50 for carp is 0.0507 mg/liter, whereas that value for centrarchids ranges from 0.237 mg/liter for small mouth bass (Micropterus dolomieui) to 0.720 mg/liter for bluegill (Lepomis macrochirus). The toxicant is significantly less toxic to bluegill in cold water (12C) than in warmer water (17 and 22C), and it is more toxic in hard water than in soft water. Toxicity tests with green sunfish (Lepomis cyanellus) show that the toxicant is significantly more toxic in high pH water (pH = 9.0) than in low pH water (pH = 6.0), and that the toxicant detoxifies at a faster rate in pH 9.0 than in lower pH water. Some aquatic invertebrates are more resistant than fish to the toxicant. The chemical is a good candidate selective toxicant, but additional studies are needed to support a registration for its use. (Katz) W75-03509

TEMPERATURE EFFECTS ON GROWTH AND RESPIRATION RATES OF DOLANIA AMERICANA (EPHEMEROPTERA),

Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab. R. S. Harvey.

Presented at Thirty-fifth Annual Meeting of the Association of Southeastern Biologists, Savannah, Georgia, April 18-20, 1974. 6 p, 7 fig, 4 ref.

Descriptors: Temperature, *Mayflies, *Respiration, *Growth rates, Aquatic insects, In-Descriptors: vertebrates, Benthic fauna, Juvenile growth stage, Methodology, Laboratory tests, *Georgia, *Water temperature, Lethal limit. Identifiers: *Sublethal effects, *Dolania amer-

icana, Three Runs Creek(Geo).

Long range studies are being made to determine the effects of nonlethal elevations in water temperature on the ecology of stream organisms. The Mayfly is being studied to determine the effects of seasonal changes in temperature on population growth rates, and the effects of slight elevations in water temperature on the respiration rates of maturing individuals. Growth and respiration rates of the populations increased with temperature until the 2-year - old nymphs emerged in June and July. Throughout the previous year, respiration rates increased with body weight and water temperature. (Katz) W75-03510

CHRONIC CADMIUM TOXICITY TO THE BLUEGILL (LEPOMIS MACROCHIRUS RAFINESQUE),

National Water Quality Lab., Duluth, Minn.

J. G. Eaton.

Transactions of the American Fisheries Society, No 4, p 729-735, 1974. 1 fig, 4 tab, 11 ref.

Descriptors: "Toxicity, "Lethal limit, Bioassay, "Cadmium, "Sunfishes, Immature growth stage, Juvenile fish, Spawning, Reproduction, Water polution sources, Metals, Mortality, Spectrophotometry, Analytical techniques, Regression analysis, Hardness(Water), Water pollution effects.

Identifiers: *Bioconcentration, Tissue.

Nine out of 18 adult bluegills exposed for 11 months during a chronic bioassay including reproduction were killed at 80 micrograms/liter of cadmium in water of 200 mg/liter (as CaCO3) hardness. Progeny exposed for 30 days were killed at 90 micrograms/liter. Adult fish spawned at 239 micrograms/liter and at 2,140 micrograms/liter, but most larvae were severely crippled 6 days after hatching at these concentrations. No effects on survival, development, or reproduction were attributable to cadmium at 31 micrograms/liter. The highest tissue residues were found in liver, in-testine and caecum, and kidney. Cadmium concentrations increased with exposure concentration in gill liver, and intestine and caecum, but not in kidney. At least until more information is available on cadmium toxicity in different water types, chronically toxic and 'just safe' continuous exposure concentrations probably can be estimated better by relatively short-term exposures of embryos and larvae than by the use of application factors. (Katz) W75-03511

PHYSIOLOGICAL AND ECOLOGICAL SIGNIFICANCE OF THE CHEMICAL INSTABILITY OF THE URIC ACID AND RELATED PU-

Group 5C-Effects Of Pollution

RINES IN SEA WATER AND MARINE ALGAL CULTURE MEDIUM, Fisheries and Marine Service, Vancouver (British

Columbia). Vancouver Lab.

N. J. Antia, and A. F. Landymore.

Journal of the Fisheries Research Board of Canada, Vol 31, No 8, p 1327-1335, August 1974. 3 fig, 3 tab, 26 ref.

Descriptors: *Chemical degradation, *Nitrogen reactions, compounds, *Phytoplankton, reactions. compounds, *Chemical reactions, *Phytoplankton, *Marine microorganisms, *Chemical analysis, Spectrophotometry, Analytical techniques, Water analysis, Hydrogen ion concentration, Nitrogen cycle, Plant growth substances, Methodology, Kinetics, Trace elements, Pollutant identification.

Identifiers: *Uric acid, *Purines.

The chemical instability of uric acid and related purine bases in a seawater phytoplankton culture medium was evaluated spectrophotometrically medium was evaluated spectrophotometrically from concentration changes incurred in aseptic in-cubation at about 20 C under cool-white light or complete darkness. Uric acid showed slow degradation in darkness, which was increased severalfold by illumination. Xanthine showed a small degree of degradation only from illumination, but adenine, guanine, and hypoxanthine ap-peared to be stable under both test conditions. The degradation of uric acid was traced to three factors differing in intensity of effect: (1) pH of sea water (minor effect), (2) photolysis (additional minor effect), (3) trace-metal cation content of sea water (major effect), whereas that of xanthine could be traced only to photolysis. These results cast doubt on previous reports of utilization of uric acid as Nsource for phototropic growth of marine plank-tonic algae in that the compound actually utilized may be degradation product(s) rather than the intact purine. Ecologically, the results signify that uric acid could undergo rapid chemical turnover, without biological intervention, in the marine environment. (Katz) W75-03512

HEAVY METAL TOLERANCE IN TYPHA LATIFOLIA WITHOUT THE EVOLUTION OF TOLERANT RACES,

Syracuse Univ., N.Y. Biological Research Labs. S. J. McNaughton, T. C. Folsom, T. Lee, F. Park, and C. Price.

Ecology, Vol 55, No 5, p 1163-1165, Late Summer 1974, 3 tab, 15 ref.

Descriptors: *Adaptation, *Ecotypes, *Heavy metals, *Soil contamination effects, Environmental effects, "Zinc, "Cattails, Soils, Environment, Cadmium, Lead, Aquatic plants, Soil analysis, Bioassay, Industrial wastes. Identifiers: "Typha latifolia.

Clones of the broad-leaved cattail and soil samples were obtained from near a zinc smelter and from a control location. In the smelter location, soil, zinc concentration was 385 times higher, cadmium con-tent 37 times higher and lead content 16 times higher than for the control. No evidence for the evolution of heavy metal tolerant races could be detected in experiments in which genotypes from both locations were grown on both soils. Growth of genotypes from both localities was inhibited on the heavy metal soil, but not to the extent that would be expected from previous studies of heavy metal effects. It is apparent that some peculiarity of the physiology of Typha confers a general re-sistance to heavy metal tolerance. This may be a cell wall metal precipitation mechanism. (Katz)

THE USE OF POLLUTANTS FOR AQUACULTURE - CONDITIONING OF WASTES FOR AQUACULTURE,

Papua and New Guinea Univ., Port Moresby (New

For primary bibliographic entry see Field 5D.

PRELIMINARY EXPERIMENTS ON THE EF-FECT OF THIODAN AND ENDRIN ON FISH CULTURE IN INDONESIA,

Research Inst.. Inland Fisheries (Indonesia).

A. Hardjamulia, and S. Kusumadinata.

In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 56-64. 10 ref, 5

Descriptors: *Pesticides, *Aquiculture, *Toxicity, *Endrin, *Fish farming, *Path of pollutants, Fish-kill, Environmental effects, Insecticides, Organic pesticides, Bioassay, Lethal limit, Mortality, Pesticide residues.

Identifiers: *Thiodan, Rice fields, Cyrpinus carpio, *Indonesia.

Experiments on the acute lethal effects of Thiodan and Endrin applications to fish in rice fields have been performed. Investigations on the effects of the subsequent movement of Endrin with irrigation water to downstream rice fields has been carried out. A potential hazard of insecticide residue carried by river systems to brackish water and coastal aquaculture areas has also been examined. (Katz) W75-03515

RECENT DEVELOPMENTS IN THE NEW ZEA-LAND ROCK OYSTER FARMING INDUSTRY (1970-72) AND PROBLEMS REGARDING AQUATIC POLLUTION, Ministry of Agriculture and Fisheries, Auckland

(New Zealand)

L. Curtin.

In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 51-55. 1 tab.

Descriptors: *Aquiculture, *Oysters, *Shellfish, Farming, *Water quality, *Commercial shellfish, Water pollution, Competing uses, Leases, Recreation, Public health, E. coli, Aquatic animals. Identifiers: *New Zealand.

Recent developments in the New Zealand rock oyster farming industry are reviewed and problems regarding pollution, leasing of suitable waters and conflicts with recreational uses of coastal areas are considered in relation to the future development of the industry. Lack of prescribed standards for determining the quality of cultured oysters and the resulting interpretations by various concerned agencies of the methods used for this purpose has become a major problem for the industry. A possible change of the present concept of determining oyster quality by examina-tion of the meat to one based on water quality is of serious concern to farmers in view of the high standards set for waters of SA quality. Recommendations for suitable water quality standards, control of coastal pollution and multiple use of coastal areas are given. (Katz) W75-03516

ENVIRONMENTAL ASPECTS OF FIN ERO-SION AND TUMORS IN SOUTHERN CALIFOR-NIA DOVER SOLE, Southern California Coastal Water Research Pro-

ject, El Segundo.
A. J. Mearns, and M. Sherwood.
Transactions of the American Fisheries Society,
No 4, p 799-810, 1974. 2 tab, 9 fig, 25 ref.

Descriptors: *Fish diseases, *Municipal wastes, *Water pollution effects, Domestic wastes, Waste disposal, *California, Laboratory tests, Environmental effects, Water pollution sources, Industrial wastes, Microscopy, Analytical techniques, Fish

Identifiers: *Dover sole, Microstomus pacificus, *Fin erosion, Tumors.

Between 1969 and 1972, a number of Dover sole (Microstomus pacificus) with eroded fins and skin tumors were collected in a series of trawls off the coast of southern California. Field and laboratory observations suggest that the two diseases were distinct syndromes operating at different growth stages in the life cycle of the Dover sole. Specimens with fin erosion were concentrated in the vicinity of the major municipal waste-water discharge site in the southern California area. Histological observations showed the disease to be external in nature: The distribution of the diseased fish and the patterns of erosion of the various fins suggest that the disease was brought on by contact with the sediments around the wastewater outfall. Tumor-bearing specimens were more evenly distributed throughout the southern California coastal waters, and the presence of the anomaly appeared to be a function of fish size (usually occurring in specimens of less than 150 mm standard length). The spatial and temporal distributions of tumor-bearing Dover sole suggest that initiation of the disease was not related to wastewater discharges. (Katz) W75-03517

MERCURY CONTENT OF FISH AND SHRIMPS CAUGHT OFF THE BELGIAN COAST,

Ministere de l'Agriculture, Ostend (Belgium). Sea

Fisheries Research Station.

R. De Clerck, R. Vanderstappen, and W. Vyncke.
Ocean Management, Vol 2, No 2, p 117-126, September 1974. 7 fig, 3 tab, 21 ref.

Descriptors: *Mercury, *Shrimps, *Commercial fish, Heavy metals, Coast, Age, Size, Methodology, Regression analysis, Crustaceans, Commercial shellfish, Pollutant identification, Water pollution effects.

Identifiers: Plaice, Cod, Whiting, Tissue analysis,

Mercury was determined in 800 samples of plaice, whiting, cod, sprat, and shrimps caught off the Belgian coast during a one year period. The greater portion of values were situated below 0.250 ppm with the highest frequencies occurring between 0.100 and 0.250 ppm. Significant regressions between length of the fish and mercury content were found for male and female whiting and for male cod only. Neither season nor fishing ground had a significant influence on the mercury content of shrimps. (Katz) W75-03518

DISSOLVED OXYGEN REQUIREMENTS OF NEWLY-HATCHED LARVAE OF THE STRIPED BLENNY (CHASMODES BOSUI-ANUS), THE NAKED GOBY (GOBIOSOMA BOSCI), AND THE SKILLETFISH (GOBIESOX STRUMOSUS), Muskingum Coll., New Concord, Ohio.

V. P. Saksena, and J. B. Edwin. Chesapeake Science, Vol 13, No 1, p 23-28, March, 1972, 4 tab, 2 fig. 9 ref.

Descriptors: *Dissolved oxygen, *Lethal limit, Estuarine fisheries, *Bioassay, Marine fish, Immature growth stage, *Mortality, Estuarine environment, Water pollution effects. Identifiers: *TL50, Chasmodes bosquianus, Gobiosoma bosci, Gobieson strumosus, *Striped blennie, *Skillet fish, *Naked gobies.

Newly hatched larvae of the striped blenny, the naked goby and the skillet fish were exposed for 24 hours to varying concentrations of dissolved oxygen obtained by purging York River water with pre-purified grade nitrogen. The experimental ap-paratus is described. The striped blennies and the naked gobies had 24 - hour TL50 of 2.50 mg/l and 1.30 mg/l respectively. The TL 50 for skilletish was not calculated, but apparently lies between 0.72 mg/l and 1.23 mg/l. (Katz) W75-03519

Effects Of Pollution—Group 5C

EFFECT OF NITROGEN SUPERSATURATED WATER ON COHO AND CHINOOK SALMON, Bureau of Sport Fisheries and Wildlife, Seattle,

Wash. Western Fish Disease Lab. R. R. Rucker, and P. M. Kangas. The Progressive Fish-Culturist, Vol 36, No 3, p

152-156, July 1974. 6 fig. 9 ref.

Descriptors: *Dissolved oxygen, *Salmonids, Supersaturation, *Chinook salmon, *Nitrogen, *Fry, Juvenile fish, Bioassay, Fish eggs, Gases, Mortali-Water pollution effects, Laboratory tests,

ty, Water pollution effects, Laboratory tests, Pathology. Identifiers: *Gas bubble disease, *Coho salmon, Oncorhyncus kisutch. Oncorhynchus tshawytscha.

The eggs and fry of coho and chinook salmon were raised in water with varying levels of supersaturation. Eggs were not found to be affected by con-centrations of 128 percent N2 + Ar and O2 in water. Different manifestations of gas bubble disease were observed in coho and chinook fry after 10 and 20 days respectively. These results indicate that air or nitrogen supersaturated waters up to 128 percent saturation do no harm to chinook or coho eggs and that it seems safe to rear the fry for about a week in waters containing this level of saturation. (Katz) W75-03520

TIDAL AQUARIUM FOR LABORATORY STU-DIES OF ENVIRONMENTAL EFFECTS ON MARINE ORGANISMS,

National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center R. C. Clark, Jr., and J. S. Finley.

The Progressive Fish-Culturist, Vol 36, No 3, p 134-137, July 1974. 2 fig, 1 ref.

Descriptors: *Laboratory tests, *Aquaria, Equipment, Technology, Design, *Marine animals, Bioassay, Methodology, Oil spills, Oil pollution, Water pollution effects, *Environmental effects, Organic compounds.

Identifiers: *Sublethal effects.

A laboratory test chamber for studying the effects of an oil slick on intertidal organisms was developed to determine the uptake of sub-lethal levels of paraffinic hydrocarbons from crude oils and petroleum products by marine organisms. The system consists of four major components - a test and control tank to hold the organism, a siphon assembly, a pump assembly and an aeration system. The components are described in detail and operation is explained. (Katz)

THE TOXICITY OF TNT AND RELATED WASTES TO AN AQUATIC FLOWERING PLANT, LEMNA PERPUSILLA, Edgewood Arsenal, Aberdeen Proving Ground, Md.

C. D. Schott, and E. C. Worthley.

Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 158, \$3.25 in paper copy, \$2.25 in microfiche. Edgewood Arsenal Technical Report EB-TR-74016, April 1974. 18 p, 2 tab, 2 fig, 2 ref.

Descriptors: *Phytotoxicity, *Industrial wastes, *Toxicity, *Phytoplankton, *Water pollution effects, Water pollution sources, Growth rate, Herbicides, Bioassay, Hydrogen ion concentration, Flowering. Identifiers: *Lemna perpusilla, *TNT.

Some products of TNT manufacture, and one transformation product, 4-amino-2 nitrotoluene were assessed for phytotoxicity in order to deter-mine if TNT wastes are potentially hazardous. The herbicide 2,4-dichlorophenoxyacetic acid was used as the positive control for comparative pur-poses. 2,4-Dichlorophenoxyacetic acid depressed colony growth of Lemna perpusilla at a concentration of 0.1 ppm, whereas 2,4 dinitrotoluene depressed colony growth at a concentration of 0.5 ppm. At pH 6.3, the highest no-effect concentration range for each compound is: 2,4-dichlorophenoxyacetic acid, 0.01 to 0.1 ppm; 2,4dinitrotoluene, 0.1 to 0.5 ppm; 2,4,6 trinitrotoluene, 0.5 to 1.0 ppm; 4-amino-2-nitrotoluene, 10 to 50 ppm; and 0-nitrotoluene, 10 to 100 ppm. (Katz) W75-03523

SEWAGE AND AQUACULTURAL PRODUC-

Victoria Univ., Wellington (New Zealand). For primary bibliographic entry see Field 5D. W75-03524

EFFECT OF SALT WATER INGESTION ON PREGNANCY IN THE EWE AND ON LAMB

Commonwealth Scientific and Industrial Research
Organization, Adelaide (Australia), Div. of Nutritional Biochemistry.

For primary bibliographic entry see Field 3C. W75-03529

TOLYTIC BACTERIA IN AN EUTROPHIC LAKE, (IN GERMAN), Freiburg Univ. (West

Freiburg Univ. (West Germany). Limnologisches Institut.

Arch Hydrobiol Supplementb, Vol 42, No 3/4, p 483-496, 1973, English summary. Identifiers: *Aerobic bacteria, Bacteria,

Identifiers: "Aerobic bacteria, Bacteria, "Cytophaga, Epilimnion, "Eutrophication, Lakes, Pectolytic bacteria, Strain, Yeast extract, "West Germany(Constance), Water pollution effects.

For a period of 7 mo. the aerobic pectolytic bacteria of a eutrophic lake near Constance (West Germany) were counted on pectate gel plates. Most of the pectolytic bacteria were found in the epilimnion. Bacteria of the genus Cytophaga were the most frequent pectin decomposers. In experi-ments with an isolated strain of that genus it could be shown that pectin degradation by these bacteria was reversibly repressed by yeast extract.--Copyright 1974, Biological Abstracts, Inc. W75-03538

EFFECT OF BOD(5) LOADS AND CAR-BOHYDRATE CONCENTRATION ON WASTE WATERS ON THE DEVELOPMENT OF FILA-MENTOUS BACTERIA (VLIYANIE NAGRU-ZOK PO BPK(5) I KONTSENTRATSII UGLEVODOV V STOCHNYKH VODAKH NA RAZVITIE NITCHATOI BAKTERII), For primary bibliographic entry see Field 5D.

THE INFLUENCE OF A PAPER MILL WITH ADJACENT COATING PLANT ON THE BIOLOGICAL OXYGEN DEMAND OF THE RECEIVING STREAM (DER EINFLUSS EINER PAPIERFABRIK MIT ANGESCHLOSSENER STREICHEREI AUF DEN BIOLOGISCHEN SAUERSTOFFVERBRAUCH DES VORFLU-TERS).

Zdruzene Papirnice. Liubliana-Vevce (Yugoslavia). For primary bibliographic entry see Field 5B. W75-03605

RENAL CONCENTRATION OF CITRATE AS A REGATIVE MODULATOR OF DIURETIC RESPONSE TO MERCURIALS, Medical Coll. of Ohio, Toledo. Dept. of Phar-

v. Nigrovic, and E. J. Cafruny. Nature, Vol 247, No 5440, p 381-383, February 1974. 2 tab, 11 ref.

Descriptors: *Mercury, *Animal physiology, Mammals, Organic compounds, Laboratory tests, Laboratory animals, Chemical reactions.

The hypothesis that alkalosis increases and acidosis decreases the renal concentrations of an en-dogenous metabolite which is capable of complexing mercury was tested. In the kidneys the partition of mercuric ions between the diuretic receptor and the hypothetical ligand would then depend on the relative affinity for mercury. To test the hypothesis, conditions were chosen which would alter the renal concentration of citrate with or without inducing concomitant changes in acidbase status. Two series of experiments were per-formed on anesthetised dogs of either sex. The first series of experiments was intended to determine whether the citrate concentration in the kid-neys is altered in the desired direction in dogs infused with hydrochloric acid or sodium hydroxide for 2 hours, or injected with sodium fluoroacetate. In the second series, the dogs were treated as in thefirst series. At the end of the 2 hour pretreatthefirst series. At the end of the area processing ment period, mercury-cysteine complex was injected intravenously. There was a slight decrease in the glomerular filtration rate in dogs pretreated with acid alone and a larger decrease in acidotic dogs treated with uranyl benzoate, in alkalotic dogs, and in fluoroacetate pretreated dogs. The results were in agreement with and furnished experimental support for the hypothesis. (Jernigan-Vanderbilt) W75-03616

SELENIUM BIOCHEMISTRY, National Heart and Lung Inst., Bethesda, Md. T. C. Stadtman. Science, Vol 183, No 4128, p 915-922, March, 1974. 2 tab. 78 ref.

Descriptors: *Biochemistry, *Enzymes, *Animal metabolism, Oxidation, Reduction(Chemical), Metals, Nutrition, Reviews. Identifiers: *Selenium.

The biochemical characteristics of selenium were discussed. Proteins containing selenium are essential components of certain bacterial and mammalian enzyme systems. Only three enzyme-catalyzed reactions have been shown to require the participation of a selenium-containing protein.

These are the reactions catalyzed by (1) formate dehydrogenase of bacteria (2) glycine reductase of clostrida, and (3) glutathione peroxidase of erythrocytes. They are all oxidation-reduction reactions. The form in which selenium occurs in these selenoproteins is unknown. Identification of the chemical nature of selenium in proteins participating in electron transport processes should enable us to determine selenium's specific role and to understand the basic defects in certain cardiac and skeletal muscle degenerative diseases which are selenium-deficiency syndromes. (Jernigan-W75-03620

MERCURY IN TUNAS: A REVIEW, Inter-American Tropical Tuna Commission, LaJolla, Calif. C. L. Peterson, W. L. Klawe, and G. D. Sharp. Fishery Bulletin, Vol 71, No 3, p 603-613, July, 1973. 1 fig, 2 tab, 35 ref.

Descriptors: *Mercury, Fish, *Tuna, Food, *Distribution patterns, Aquatic life, Oceans, Organic compounds, Food chains, Public health, Toxicity, Human pathology, Sea water, Variability, *Reviews. Identifiers: *Methylmercury.

Mercury in the aquatic environment comes from both natural processes and industrial activities. The latter probably have not significantly altered the mercury content of the high seas where most tunas are captured. Mercury compounds enter

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aquatic organisms through the food web and/or by direct extraction from solution. The relative importance of these pathways in tunas is unknown.

Mercury occurs in tuna principally in the form of methylmercury. Generally, tunas appear to have higher mercury levels than those fish species which occupy a lower level in the food chain. Mercury content of tunas varies according to fish size. However, other factors such as area of capture, differential growth rates, varying analytical differential growth rates, varying analytical techniques, and different sampling methods may account for some of the observed variation. The U.S. Food and Drug Administration has established an in-house standard of 0.5 ppm of mercury for fishery products sold in the United States. Other countries have established limits as high as 1.0 ppm. (Jernigan-Vanderbilt) W75-03622

OBSERVATIONS ON THE ECOLOGY OF LACRUSTRINE POPULATIONS OF THE THREESPINE STICKLEBACK (GASTEROSTEUS ACULEATUS L., 1758) THE MATAMEK RIVER SYSTEM, QUEBEC, 1758) IN Ottawa Univ. (Ontario). Dept. of Biology.

Brian W. Coad, and G. Power.

Nat Can (Que) Vol 100, No 5, p 437-445, 1973. Identifiers: Brooks, *Canada(Matamek River), Feeding, Gastrosteus-aculeatus, *Ecology. *Ecotogy, Growth, Insects, *Lacustrine populations, Plans-ton, Quebec, Rivers, Schistocephalus-solidus, Spawning, *Three-spined stickleback, Trout,

Lacrustrine populations of the threespine stickleback in the Matamek River System, Quebec (Canada), were studied during 1970-1971. Ex-amination of otoliths and length-frequency histograms showed three age groups to be present. Growth was slower in the lake populations compared to a marine population. Spawning occurred in July of the 3rd year of life but females parasitized with plerocercoids of Schistocephalus parasitized with pierocercoids or scinistocephaius solidus did not breed. The mean number of parasites/fish was 1.93 for the 1 + age group and 2.97 for the 2 + age group and infestation levels often approached 100%. Mean number of eggs was 88 and mean diameter was 1.56 mm. The diet of young sticklebacks was chiefly zooplankton while larger sticklebacks also fed on drift insects in competition with brook trout.--Copyright 1974, Biological Abstracts, Inc.
W75-03625

INFLUENCE OF SALINE DRINKING WATER ON MINERAL BALANCES IN SHEEP, Commonwealth Scientific and Industrial Research

Orga nization, Adelaide (Australia). Div. of Nutritional Biochemistry.

For primary bibliographic entry see Field 3C. W75-03637

INVESTIGATIONS ON THE INCORPORATION OF DIFFERENT ALGAE BY S ZOOPLANKTON-SPECIES, (IN GERMAN),

A. Infante. Arch Hydrobiol Supplementh, Vol 42, No 3/4, p

340-405, 1973, English summary. Identifiers: *Algae, Asterionella-formosa, *Carbon-14 tracers, Cryptomonas-ovata, Cyclops-vicinus, Daphnia-longispina, Daphnia-pulex, Eu-diaptomus-gracilis, Eurycercus-lamellatus, vicinus, Daphnia-iongraphicalis, Eurycercus-lamenatus, Nitzschia-actinastroides, Plankton, Scenedesmus-acuminatus, Sida-crystallina, *Absorption, Staustraman.

Stichococcus-minutissimus,

A study was made of the rate of incorporation (assimilation) of 6 algae species (Asterionella for-mosa, Nitzschia actinastroides, Scenedesmus acuminatus, Stichococcus minutissimus, Staurastrum minatus, Stechococcus minutussimus, Staurastrum sp., Cryptomonas ovata) by 6 zooplankton species (Daphnia pulex, Daphnia longispina, Sida crystal-lina, Eurycercus lamellatus, Eudiaptomus gracilis, Cyclops vicinus) during 24 h, using 14C as tracer.— Copyright 1974, Biological Abstracts, Inc. W75-03643

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,

In: Sunshine State Agricultural Research Report for September-October, 1973, p 8-11. (1973). 4

Descriptors: *Water pollution sources, *Eutrophication, *Water pollution control, *Agricultural runoff, *Drainage engineering, Water pollution, Pollution abatement, Phosphates, Nitrates, Nutrients, Water management(Applied), Recreation, Lakes, Impoundments, Farm ponds, Impounded waters, Agriculture, Data collections, Waste treatment.

After years of controversy over who is responsible for the pollution of Lake Apopka in Florida, a concerted effort is now being made to restore the lake so it can again be used for fishing and recreation. During the past 25 years a steady infusion of nutrients, particularly phosphates and nitrates, has caused the lake to become highly eutrophic. The major sources of these nutrients have been effluents from municipal sewage, drainage from muck farms, wastes from citrus processing plants, decaying hydrophytes and aquatic animals. Of all pollution control efforts now underway, the most ambitious involves 33 farmers around the northeast shore of Lake Apopka. Their objective is to retain their nutrient-rich irrigation water in holding ponds instead of pumping it back into Lake Apopka. Data obtained from the project will be used to develop an abatement system for polluted drainage water from organic soils. system is expected to serve as a model for similar pollution control systems elsewhere in the United States. (Ritchie-Florida)

CHRONIC FLUORIDE INTOXICATION FROM DRINKING WATER: PRELIMINARY REPORT,

H. T. Petraborg. Fluoride, Vol 7, No 1, p 47-52, 1974.

Identifiers: Chronic toxicity, Fluorides, Gastrointestinal symptoms, Human diseases, Neurological symptoms, *Wisconsin(Milwaukee), Polydipsia, symptoms, *Wisconsin(Milwaukee), Polydipsia, *Toxicity, *Potable water, Water pollution ef-

Seven individuals in the Milwaukee, Wisconsin, area presented a history of intolerance to fluoridated water. They experienced mainly gastrointestinal and neurological symptoms, polydipsia and increasingly severe general disability. This progressive disease began when they moved into a fluoridated city or shortly after fluoride was added to the water supply to their community. It cleared up promptly when they moved their residence to nonfluoridated communities or upon substituting spring water with little or no fluoride. During their illness they had not been aware that their water supply was fluoridated .-- Copyright 1974, Biological Abstracts, Inc. W75-03695

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IN-PACT STATEMENT).

Army Engineer District, San Francisco, Calif. For primary bibliographic entry see Field 4A. W75-03706

ALGAL NUTRIENT LIMITATION IN LAKE ONTARIO AND TRIBUTARY WATERS, Wisconsin Univ., Madison. Dept. of Civil En-

N. Sridharan, and G. F. Lee. Preprint (1974). 35 p, 10 fig, 5 tab, 1 ref. EPA R 800537.

Descriptors: *Algae, *Nutrients, *Lake Ontario, Limiting factors, Tributaries, Plankton, Analytical techniques, Phosphorus, Nitrogen, Bioassay, Eutrophication, Nutrient removal Identifiers: Selenastrum capricornutum.

In nutrient-spiking studies of Lake Ontario and its tributary rivers of Niagara, Black, Genesee, and Oswego waters both nitrogen and phosphorus were required for stimulation of cultured and 'natural' algae growth. Samples of the Genesee and Oswego Rivers generally showed nitrogen stimulation. Also, many of the samples from these rivers demonstrated stimulation due to the addition of micronutrients: however care must be exercised in interpreting micronutrient stimulation as the micronutrient solution contained EDTA, a strong complexing agent, which can eliminate toxic elements in the water. Essentially all lake water samples showed phosphorus limitation. It is possible that phosphorus removal at domestic wastewater treatment plants located in these areas could be sufficient to cause phosphorus to be limiting. It is also possible that advanced waste treatment could reduce the concentration of the apparent toxicants in these rivers which would stimulate algae growth in the rivers and nearshore lake waters due to excess of phosphorus present. Even though the potential impact of phosphorus removal cannot be predicted for these rivers and nearshore Lake Ontario waters, it is clear that such a practice will be of some benefit in reducing and possibly reversing the excessive eutrophication trend. (Auen-Wisconsin) W75-03757

NITROGEN BUDGETS OF GREAT PLAINS IM-POUNDMENTS,

Oklahoma State Univ., Stillwater. Dept. of Zoolo-

D. W. Toetz.

In: Man Made Lakes: Their Problems and Environmental Effects, American Geophysical Union, Washington, D.C. 1973, p 567-571. (Geophysical Monograph Series Vol 17). OWRT A-023-OKLA(3).

Descriptors: *Nitrogen, *Impoundments, *Great Plains, Cycling, Reservoirs, Influent streams, Precipitation(Atmospheric), Groundwater, Nitrogen fixation, Nitrates, Runoff, Cyanophyta, Benthos, Sediments, Aquatic plants, Denitrification. Eutrophication.

Identifiers: *Nitrogen sources.

Nitrogen in a biologically unstable form can enter a lake in influents, as precipitation, or as gas on the surface, in groundwater, and by biological nitrogen fixation. Data on mean discharge and nitrate in 109 streams in the United States indicate that a close relationship exists between stream runoff and nitrate load on an areal basis. Seasonal variation can be expected. Groundwater may be an important source of N for certain reservoirs. Ammonia can be volatilized from feedlot operations and enter lakes from the atmosphere. Biological nitrogen fixation by certain algae, bacteria, and fungi may cause increases. Nitrogen losses from outlets of impoundments are probably more important in reservoirs than in natural lakes because of the higher rate of water exchange in reservoirs. Less is known of other losses: sediments as a sink, fish catch, aquatic macrophyte removal, and groundwater recharge. Denitrification prepresents an important nitrogen sink. Nitrate in density currents in the anoxichypolimnion of some reservoirs can be converted rapidly to nitrogen. Use of detritus and assimilation of dissolved organic matter by microbes may be more significant than algal production as a production process. (Jones-Wisconsin)

Effects Of Pollution—Group 5C

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE, National Environmental Satellite Service, Hill-crest Heights, Md.

For primary bibliographic entry see Field 5A. W75-03760

A CRITICAL REVIEW OF VOLLENWEIDER'S NUTRIENT BUDGET MODEL AND OTHER RE-

LATED MODELS,
Ministry of the Environment, Rexdale (Ontario). Limnology and Toxicity Branch.

P. J. Dillon.

Water Resources Bulletin, Vol 10, No 5, p 969-989, 1974, 2 tab, 13 ref.

Descriptors: *Nutrients, *Mathematical models, *Reviews, Eutrophication. Stratification, Sedimentation,

Identifiers: *Nutrient budget, *Vollenweider's model, Flushing, *(Arch. Hydrobiol. 66:1-36, 1969).

Early attempts at nutrient budget modeling considered only the case where there was no loss of the material by sedimentation, i.e., the substance was assumed to be conservative. Nonstratified and stratified conditions have both been investigated under these terms. An elegant model, taking into account loss of a substance by sedi-mentation as well as flushing was presented by Vollenweider. Four important assumptions are inherent in the simple version of that model: the supply J (or loading L) is assumed to be constant through time, as are the flushing and sedimentation rates; the sedimentation process is treated as a first-order chemical process dependent only on the amount of material in the lake (and as a further consideration, dependent on the loading as well); stratification (and other non-uniform mixing features) is ignored, resulting in an unrealistic flushing rate; the concentration of a substance in the outflow is equated to the mean concentration in the lake. Although this model has several shortcomings, it is particularly valuable because it can have immediate practical value in terms of water management policy development. The basic shorcomings in the model are analyzed and sup-pestions are made to alter the model to take these factors into account. (Long Williams) factors into account. (Jones-Wisconsin) W75-03761

OIL ON THE SEA.

Massachusetts Inst. of Tech., Cambridge.; and Woods Hole Oceanographic Institution, Mass.
Symposium proceedings 'Scientific and Engineering Aspects of Oil Pollution of the Sea' May 16, 1969, Cambridge, Mass. Plenum Press, New York, 1969. 114 p.

Descriptors: *Technology, *Oil pollution, *Oceans, *Water pollution control, Oil spills, Detergents, Toxicity, Marine plants, Marine animals, Environmental effects, Dispersion, Analysis, Separation techniques, Transportation, Oil industry, Oil wells, Burning, Emulsions, Surfactants, Federal government, Judicial decisions, International waters, Legal aspects, Jurisdiction. Identifiers: *Oil slicks, Santa Barbara(Calif), Torrey Canyon, Tankers. rey Canyon, Tankers.

The current understanding of oil pollution of the seas relative to oil composition and its biological effects, oil analysis, law enforcement, long-term effects of oil pollution, countermeasures against large oil spills, and the long-term outlook are discussed. The effects and control efforts following the Torrey Canyon and the Santa Barbara oil spills are detailed. The role of chemical dispersions of the control of the contr sants in connection with the behavior of oil spills, its detrimental effects and the basis for dispersing, tests of dispersants' relative effectiveness, toxici-ty, and some practical field applications are in-cluded. Regarding oil slick spread on a calm sea, physical considerations, rate of spread, spread

from a steady source in a moving stream, are all compared with field observations. The main engineering features of physical and pneumatic booms operating as oil containment devices in the open sea are discussed. The effectiveness of removal of oil slicks by controlled combustion using CAB-0-SIL ST-2-0 is compared. The role of the federal government in oil pollution has taken the form of congressional and administrative action, judicial interpretations, and participation in international treaties and conventions. (Jones-W75-03762

THE MICROFLORA IN THE SETTLING AND SUBSOIL WATER ENRICHING BASINS OF THE BUDAPEST WATERWORKS, University of Agriculture, Godollo (Hungary).

T. Hortobagyi. Akademiai Kiado, Budapest, 1973. 341 p.

Descriptors: *Water works, *Microorganisms, *Systematics, Trophic level, Settling basins, Oligotrophy, Eutrophication, Chlorophyta, Oligotrophy, Eutrophication, Chlorophyta, Cyanophyta, Water purification, Filtration, Infiltration, Subsurface water, Ecosystems, Phytoplankton, Algae, Bacteria, Diatoms. Identifiers: *Budapest(Hungary), *River Danube, Bacillariophyceae, Conjugatophyceae.

The settling and subsoil infiltration basins of the Budapest Waterworks limnologically belong to the River Danube. On several occasions differences were observed between the actual trophity and trophic type of the basins. Rich and variegated photocoenoses may alternate with poorly populated oligotrophic conditions. The discolorations of the water as well as the formation of water blooms indicate a greater degree of pollution in the river. There is a significant rise both in the number of taxa and individuals proceeding from the River Danube through the settling basins reaching the highest peak in the southwestern corner of the in-filtration basin. In the formation of the phytocoenoses certain algal phyla participate in various degrees both in time and space. The water of the basins is betamesosaprobiont in character; it is more pronounced in the infiltration basin. Species with the greatest number of individuals were Planctomyces Bekefii. Merismopedia tenuissima, Microcystis spp., Stephanodiscus Hantzchii, Cryptomonas erosa, Hyaloraphidium contortum var. tenuissimum, Lambertia Judai, Micractinium var. tentusmum, Lamberta Judai, Micractinum pussillum, and Scenedesmus spp. Of the organ-isms identified, the highest number of taxa (266) belong to the order Chlorococcales of the phylum Chlorophyta. The other significant group is Bacillariophyceae with 39 taxa, Cyanophyta 33, and Conjugatophyceae 22. (Jones-Wisconsin)

PRIMARY PRODUCTION IN RELATION TO TEMPERATURE STRUCTURE, BIOMASS CON-CENTRATION, AND LIGHT CONDITIONS AT AN INSHORE AND OFFSHORE STATION IN LAKE ONTARIO,

Canada Centre for Inland Waters, Burlington (Ontario)

P. Stadelmann, J. E. Moore, and E. Pickett. Journal Fisheries Research Board of Canada, Vol 31, No 7, p 1215-1232, 1974. 12 fig, 5 tab, 20 ref.

Descriptors: *Primary productivity, *Temperature, *Biomass, *Light, *Lake Ontario, Photosynthesis, Seasonal, Mixing, Carbon, Nitrogen, Chlorophyll, Light intensity, Stratifica-tion, Deep water, Shallow water, Spatial distribution, Temporal distribution.

The vertical and diel variation in primary production at an inshore (60 m) and an offshore station (180 m) were studied using in situ C-14 experiments and this data related to light, biomass, and temperature. During the first week the two sta-tions were investigated to obtain a single profile of physical and biochemical data. The following

week, each station was occupied for 48 h and during this period primary production measurements were conducted. A lag in increase of both biomass and photosynthesis rate at the offshore station in early summer was attributed to deep vertical mixing. Production/biomass quotients were computed using different biomass parameters such as particulate organic carbon, nitrogen, and chlorophylla. Carbon turnover rates of the seston on an areal a. Caroon turnover rates of the sestion on an areal basis (sq m) were found to vary between 0.04-0.18 per day and 0.01-0.21 per day at the inshore and offshore station, respectively. Daily photosynthesis efficiency (energy fixed by photosynthesis/available energy) ranged from 0.1 to 1.8% at both stations. Atypical photosynthesis-light intensity curves showed that algal populations behaved differently at different depths during the stratified period. (Jones-Wisconsin) W75-03764

NUTRIENT UPTAKE KINETICS IN PHYTOPLANKTON: A BASIS FOR NICHE SEPARATION.

State Univ. of New York, Albany. Dept. of

Biological Sciences.
R. G. Stross, and S. M. Pemrick.
Journal of phycology, Vol 10, No 2, p 164-169, 1974, 4 fig. 1 tab, 28 ref. NSF GV 29347.

Descriptors: *Nutrients, *Absorption, *Kinetics, *Phytoplankton, *Niches, Photosynthesis, Phosphates, *New York, Diurnal, Diatoms, Biorhythms, Temporal distribution.

Identifiers: *Lake George(NY), Asterionella,

Identifiers: *Lake Tabellaria, Fragilaria.

Phytoplankton photosynthetic rhythms have long been observed and the total response may result from the expression of an intrinsic rhythmicity in the photosynthetic capacity of a least one major component. Daily patters of incorporation of carbon dioxide and inorganic phosphates were measured in phytoplankton from Lake George. Photosynthesis rates oscillated in phase for the entire assemblage and for individual cells of Asterionella, Tabellaria, and Fragilaria. The photosynthetic capacity was maximal in early afternoon. Daily patterns of phosphate uptake were also rhythmic. At ambient concentrations the assemblage takes up phosphate maximally in the morning while individual cells of the large diatom take it up maximally in the evening. A kinetic analysis of phosphate uptake indicated two uptake yelocities for Tabellaria and Frafilaria cells: a hyperbolic function at small and an apparently linear relationship at relatively large concentrations. The large diatoms, in contrast to the total assemblage, functioned maximally at two separate times of the day: in the evening at ambient levels and in the morning at 0.4 micromoles and larger concentrations. Temporal stratification of the nutrient niche may be achieved by several uptake mechanisms in the algal cell functioning at different times of day or with a variable uptake velocity. (Jones-Wisconsin) W75-03766

NITROGEN AND PHOSPHORUS AVAILABILI-TY IN LAKE ONTARIO TRIBUTARY WATERS DURING IFYGL,
Texas Univ., Dallas. Inst. for Environmental

W. F. Cowen, K. Sirisinha, and G. F. Lee. Preprint (1974). 33 p, 1 fig, 10 tab, 18 ref. EPA R-

Descriptors: *Measurement, *Nitrogen com-pounds, *Phosphorus compounds, *Lake Ontario, Tributaries, Algae, Nutrients, Limiting factors, Water pollution sources, Analytical techniques, Bioassay, *New York. Identifiers: Niagara River(NY), Genesee

Identifiers: Niagara River(NY), Genesee River(NY), Oswego River(NY), Black River(NY).

What forms of N and P should be measured and how much of the non-readily available N and P

Group 5C-Effects Of Pollution

should be considered as potentially available to algae are discussed. It is recommended that the available phosphorus be computed by adding the avamore prospindus be computed by adding the soluble orthophosphorus to 20% of total phosphorus minus the soluble orthophosphate. The 20% figure is highly variable, and properly the value should be 20 plus or minus 20. Total P should value should be 20 plus or minus 20. Total P should not be used for tributary sources since a substantial part of the P associated with particulate matter will not become available in the lake. One of several procedures for nitrogen analysis as a nutrient source is to measure soluble ammonia and nitrate. The total Kjeldahl N should be made on the samples and the available nitrogen computed by summing ammonia-nitrogen, nitrate-nitrogen and 0.5 total Kjeldahl N minus ammonia nitrogen. and 0.3 total k-jedual N minus animons introgen. It is also important to assess weather N and P are limiting or can be made limiting as there is little need of measuring P transport if it can be domonstrated that N is the limiting element, unless the P input can be reduced to cause it to become limiting. The recommended procedures for computing estimated nutrient load is subject to considerable variation. (Auen-Wisconsin) W75-03768

WATER POLLUTION RESEARCH IN CANADA

Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5D.
W75-03770

COMPARATIVE STUDIES OF THE TOXICITY OF HEAVY METALS TO PHYTOPLANKTON AND THEIR SYNERGISTIC INTERACTIONS, Toronto Univ. (Ontario). Dept. of Botany.

T. C. Hutchinson. In: Water Pollution Research in Canada 1973, Vol 8, p 68-90, 15 fig, 1 tab, 9 ref.

Descriptors: "Toxicity, "Heavy metals, "Phytoplankton, Cadmium, Copper, Cobalt, Lead, Mercury, Nickel, Algae, Pollutants, Plantgrowth, Chlorella, Scenedesmus, Chlamydomonas, Zinc, Bioassay, Indicators, Resistance Identifiers: *Synergistic effects, Silver, Selenium,

Barium, Haematococcus, Antagonistic effects.

Which metals are toxic to phytoplankton and at what levels was investigated. Four unicellular green algae species were used for bioassay under laboratory conditions. Cadmium, copper, cobalt, lead, mercury, silver, selenium, barium, and nickel were tested for toxicity to these algae in nutrient solutions designed to support algal growth. Growth and cell division were used as a simple assay of metal toxicity under a range of concentrations for each metal. To determine efconcentrations for each metal. To determine effects of specific metal interactions, studies using metals in test pairs are described. They provide examples of synergism and antagonism between metals with respect to toxicity. Toxicity of these metals in solution to the algae had wide diversity. Marked differences between algae, with an almost a unique response to each metal, was revealed. Several metals were inhibitory to some species at 0.1 ppm or less. Silver inhibited Chlorella growth at 0.005 ppm. Most algae showed progressive decrease in growth with increasing metal concentration. Chlorella was the most sensitive to cadmium, copper, mercury, selenium and silver. Copper manum. Chiorena was the most sensitive to cadmium, copper, mercury, selenium and silver. Copper and nickel were found to act synergistically, each enhancing the other's toxicity. Selenium reduced the toxicity of cadmium thus showing metal antagonism. (See also W75-03770) (Jones-Wisconsin) W75-03775

HEAVY METAL TOLERANCE IN ALGAE ISO-LATED FROM POLLUTED LAKES NEAR THE SUDBURY, ONTARIO SMELTERS, Toronto Univ. (Ontario). Dept. of Botany. P. M. Stokes, T. C. Hutchinson, and K. Krauter. In: Water Pollution Research in Canada 1973, Vol

8, p 178-201. 14 fig, 4 tab, 5 ref.

Descriptors: *Algae, *Heavy metals, *Resistance, Nickel, Copper, Lethal limit, Absorption, Cytological studies, Water pollution effects. Identifiers: *Multiple metal tolerance, Sudbury(Ontario), Silver.

Algal isolates obtained from lakes in the Sudbury, Ontario district containing high levels of heavy metals, including nickel up to 3 ppm and 0.7 ppm of copper in solution were found to be tolerant to levels of toxic metals than were laboratory strains. Their growth response to metals in the medium is distinctive and different from that of the laboratory strains of Scenedesmus and Chlorella, which stop growing at 0.1 ppm Cu and 0.5 ppm Ni. Lake strains continued to grow up to 1.0 ppm Cu and 3.0 ppm Ni, and stop growing at 0.4 ppm Cu. Both lake isolates showed a gradually decreasing growth rate with increasing concentrations of metals whereas the laboratory strains were totally inhibited at low metal concentrations, suggesting a mechanism of metal tolerance. The ecological implications of these adaptations to high levels of toxic metals are discussed, especially the finding that the tolerant algae are adapted to high silver levels, even though silver is not a pollutant in the lakes. The ability of these algae to survive in normally toxic solutions of copper is due to their ability to accumulate it in large amounts and to continue cell division and growth. (See also W75-03770) (Auen-Wisconsin) W75-03781

LIMNOLOGICAL STUDIES ON THE RIVER YAMUNA AT DELHI, INDIA. PART II. THE DYNAMICS OF POTAMOPLANKTON POPULATIONS IN THE RIVER YAMUNA, Max-Planck-Institut fuer Limnologie zu Ploen (West Germany). Dept. of Tropical Ecology. H. Rai.

Archiv fur Hydrobiologie, Vol 73, No 4, p 402-517, 1974. 1 fig, 7 tab, 22 ref.

Descriptors: *Biological communities, *Plankton, *Rivers, Phytoplankton, Zooplankton, Diatoms, Cyanophyta, Protozoa, Rotifers, Turbidity, Light penetration, Water temperature, Nitrates, Phosphates, Oxygen, Chlorophyta, Crustaceans, Euglenophyta, Copepods, Bioindicators, Water pollution sources, Insects, Oligochaetes, Annelids

Identifiers: *River Yamuna(India), *Potamoplankton, Xanthophyceae, Ostracods, Delhi(India), Bacillariophyceae. Yamuna(India),

From February 1958 through January 1960 the Yamuna River at Delhi, India supported an abundant and diverse potamoplankton consisting of 124 genera or species of phytoplankton constants or 1-genera or species of phytoplankton and 97 genera or species of zooplankton. Rotifera represented the most abundant major zooplankton group, although the Protozoa was the dominant generic group at polluted stations. The Bacillariophyceae composed by far the dominant portion of the total annual phytoplankton. The Chlorophyceae and Cyanophyceae were second and third, respectively, in relative abundance, while the pigmented flagellates formed only a small fraction of the total phytoplankton. There is a definite increase in the Cyanophyceae among the phytoplankton and in the Protozoa and Rotifera among zooplankton, in the most polluted stations. An increase in number of some entire organism groups can be used as an indicator of sanitary conditions. The nitrate and albuminoid-N concentration and seemingly the phosphate concentration were increasingly related to phytoplankton yield; soluble silica apparently maintained almost equal concentration. This study mannameu aimost equal concentration. Inis study suggests that River Yamuna did not develop especially distinctive potamoplankton, but that most organisms were introduced by sewage outfalls. The greater concentrations below the sources of pollution were qualitatively characteristic of the nearest upstream sewage outfall. (Jones-Wisconsin) W75-03784

CHEMICAL ANALYSES FOR WATER QUALI-TY - TRAINING MANUAL.
Environmental Protection Agency, Cincinnati,

Ohio. Water Quality Office. For primary bibliographic entry see Field 5A. W75-03785

A CHECK LIST OF THE BIOTA OF LOWER CHESAPEAKE BAY, Virginia Inst. of Marine Sciences, Gloucester

Point. M. L. Wass.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-223 655, \$8.75 in paper copy, \$2.25 in microfiche. Special Scientific Report No 65, October 1972. 290 p, 804

Descriptors: *Ecological distribution, *Biota, *Chesapeake Bay, *Estuaries, *Varieties, Algae, Fungi, Wetlands, Dunes, Protozoa, Plants, Vectors(Biological), Bacteria, Invertebrates, Fish, Maryland, *Virginia, Reptiles, Birds, Mammals, Barrier islands, Waterfowl, Salinity, Sediments, Hosts, Mollusks.

This ecologically-annotated checklist will help evaluate the current status of the biota of lower Chesapeake Bay and provides a baseline against which future developmental projects and research activities can be judged. Included are lower plants, activities can be judged. Included are lower plants, wetland and dune plants, protozoa, disease organisms and parasites, free-living invertebrates, fishes of Chesapeake Bay and the adjacent coastal plain, herptiles of Maryland and Virginia coastal plain, birds dependent on open water or wetlands, and mammals of water, wetlands, and barrier islands. The list is divided into chapters which can be issued separately for specific interests. Each chapter has an index and come more reference. chapter has an index and one or more reference lists. Common names are provided for some higher plants and all vertebrates. Salinity categories are plants and all vertebrates. Saintly categories are those of the 'Venice system.' Sediment preferences for invertebrates are generalizations. Chesapeake Bay is the largest estuary in North America, subjected to broad ranges of tempera-ture, wind, turbulence, and dissolved oxygen. Salinities range from rather constant at the mouth to an ecotone. Organisms range from specialists, largely biologically controlled by predation and competition, near the mouth, to generalists, or fugitive species, accommodating to physical factors in upper reaches. Diversity is high in the lower bay. (Jones-Wisconsin) W75-03786

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA, New Hampshire Univ., Durham. Dept. of Zoolo-

gy. A. C. Borror.

For sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402, Price \$0.65. NOAA Technical Report NMFS CIRC-378, September 1973. 62 p, 97 fig,

Descriptors: *Marine animals, *New England, *Protozoa, Coasts, Estuaries, Systematics, *Bibliographies.
Identifiers: *Ciliophora.

There is an urgent need for more precise and complete identification of coastal organisms than has been available. It is mandatory, wherever possible, that organisms be identified accurately to species. Accurate scientific names unlock the species. Accurate scientific names unlock the great quantities of biological information stored in libraries, obviate duplication of research already done, and make possible prediction of attributes of organisms that have been inadequately studied. This manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the marine ciliated Protozoa of coastal

Waste Treatment Processes—Group 5D

and estuarine waters of New England. The key facilitates identification to family of nonencysted, nondividing marine ciliates at any stage in the life cycle. It is intended for use by a broad audience, hence is artificial (order not necessarily parallel to phylogenetic sequence), and is stripped of un-necessary technical terms. Within the Ciliophora there is wide variation in the arrangement of the cilia, and this forms the basis for classification. A glossary with figures gives the terms used in the describe the anatomy of marine ciliates. Collection, examination, and identification techniques are described. (Jones-Wisconsin) W75-03787

BEHAVIORAL ALTERATIONS IN A SIMPLE PREDATOR-PREY SYSTEM DUE TO PREDATOR-PREY SYSTEM DUE SUBLETHAL EXPOSURE TO MERCURY, Savannah River Ecology Lab., Aiken, S.C. H. J. Kania, and J. O'Hara.

Transactions of the American Fisheries Society, Vol 103, No 1, p 134-136, January 1974. 1 fig, 1

Descriptors: *Mercury, *Fish, *Fish behavior, *Laboratory tests, Toxicity, Ecology, Testing procedures, Analytical methods, Lethal limit, Water pollution effects. Identifiers: *Sublethal effects.

The effects of sublethal concentrations of mercury on a simple predator-prey relationship were investigated. The present work examined the direct ecological ramifications of behavioral alterations caused by stress. After a 24 hour exposure to sublethal mercury concentrations of 0.1, 0.05 and 0.01 ppm Hg(++), the ability of mosquitofish to avoid predation by bass was impaired. Fish exposed to 0.005 ppm Hg(++) were not affected. The degree of effect showed positive correlation mercury concentrations. (Jernigan-Vanderbilt)

EFFECT OF POTASSIUM AND ZINC IONS OF GROWTH AND TRYPTOPHAN SYNTHETASE IN ALKALOID PRODUCING CULTURE OF ASPERGILLUS FUMIGATUS, Maharaja Sayajirao Univ. of Baroda (India). Dept.

Manaraja Sayajirao Univ. of Batoua (India). Dept. of Microbiology.
K. K. Rao, and A. R. Gupta.
Current Science, Vol 43, No 13, p 415-416, July 5, 1974. 1 tab, 9 ref.

Descriptors: *Zinc, *Microbiology, *Nutrient requirements, Metals, Growth rates, Mineral needs, Potassium.
Identifiers: *Aspergillus fumigatus.

Potassium and zinc stimulate alkaloid formation by supplying more tryptophan through increased activity of tryptophan synthetase. The results of the analysis showed that the omission of K and Zn from the culture medium caused a decrease in both growth and alkaloid production. Alkaloid produc-tion was maximum (112 mg/1) when the K content of the medium was 200 mg/l, where there was four times more free endogenous tryptophan available to the culture due to the four fold increased activity of tryptophan synthetase. Similarly 0.75 mg Zn per I gave 110 mg of alkaloids, where again the in-crease in alkaloid yield may have been due to the availability of more tryptophan in comparison to control. The results clearly indicate that either absence or limited concentration of K and Zn decrease the synthesis of tryptophan ultimately reducing the yield of alkaloids. (Pulliam-Vanderbilt) W75-03791

EPIDEMIOLOGICAL SURVEY OF WORKERS EXPOSED TO CADMIUM, EFFECT ON LUNG, KIDNEY, AND SEVERAL BIOLOGICAL IN-DICES, Louvain Univ. (Belgium).

R. R. Lauwerys, J. P. Buchet, H. A. Roels, J. Brouwers, and D. Stanescu. Archives of Environmental Health, Vol 28, No 3, p 145-148, March 1974. 1 fig. 4 tab, 22 ref.

Descriptors: *Cadmium, *Public health, *Human *Human physiology, Testing Proteins, Analytical nathology. procedures, Toxicity, techniques, Spectroscopy.

Pulmonary ventilatory function and various biological indices have been investigated in three groups of workers exposed to cadmium dust (women with less than 20 years exposure (E1), men with less than 20 years' exposure (E2), and men with more than 20 years' exposure (E3) and in three matched control groups. The current air-borne Cd dust concentration in the workrooms was below the actual American threshold limit value (200 micrograms/cu m). A slight but signifi-cant reduction in forced vital capacity, in forced expiratory volume in one second, and in peak expiratory flow rate was found in E3 workers. Kidney damage was more prevalent than pulmonary ventilatory changes, since excessive proteinuria was observed in 15% of E2 workers and in 68% of E3 workers. The electrophoretic pattern of the urinary proteins suggests that the lesion is first glomerular and later becomes predominantly tubu-lar (mixed proteinuria). (Jernigan-Vanderbilt) W75-03705

DETERMINATION OF MERCURY IN COM-MERCIALLY IMPORTANT AQUATIC ORGAN-

Puerto Rico Dept. of Agriculture, Santurce. For primary bibliographic entry see Field 5B. W75-03796

EVALUATION OF TOLERANCE LIMITS OF SOME TOXIC SUBSTANCES IN INDUSTRIAL WASTE WATERS BY THE ICHTHYO TOXICITY TEST, (IN ITALIAN),

Camerino Univ. (Italy). Istituto di Igiene. For primary bibliographic entry see Field 5A. W75-03821

EFFECT OF WATER ON BACTERIAL MUL-TIPLICATION IN PLANT TISSUE,

Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div. J. M. Young. N Z J Agric Res 17(1): 115-119, Illus. 1974.

Descriptors: Beans, *Bacteria, *Growth rates, Effects, Pathogenic bacteria, *Plant tissues, Nutrients, Water pollution effects, Water pollution control.

Identifiers: Erwinia-herbicola, Psuedomonasfluorescens, Pseudomonas-lachrymans, Pseudomonas-phaseolicola, Pseudomonas-putida, Pseudomonas-syringae, Nonpathogenic bacteria, *Peptone.

When pathogenic and non-pathogenic bacteria were inoculated into bean leaves which were then kept saturated with water, those bacteria which are normally limited in growth increased in num-bers. Pathogens (Pseudomonas lachrymans and P. syringae) in heterologous relationships with beans multipled at a rate equal to the homologue P. phaseolicola, and to higher stationary-phase populations than developed under normal conditions of plant growth. Non-pathogenic bacteria (P. fluorescens, P. putida and Erwinia herbicola) increased in numbers, but their stationary-phase populations were lower than those of the pathogens. Peptone added as a bacterial nutrient to the inoculum of P. fluorescens did not affect the growth of the non-pathogen in bean leaves. The availability of nutrients and water to bacteria in availability of intrinsic and water to determ in the intercellular spaces of leaf tissue may be im-portant parameters regulating their development. The function of water as a determinant of specificity in host-pathogen relationships in the field is discussed .-- Copyright 1974, Biological Ab-W75-03831

SP. AT VARIOUS LEVELS OF MOISTURE, POPULATION DYNAMICS OF HOPLOLAIMUS

Pakistan Council of Scientific and Industrial Research, Karachi. M. Saeed, S. Masood, and A. M. Khan. Sci Ind (Karachi). 9(1/2): 88-90, 1972.

Descriptors: *Nematodes, *Growth rates. *Aquatic populations, Soil moisture.

Identifiers: Hoplolaimus-sp, Population dynamics.

Population dynamics of Hoplolaimus sp., the lance nematode commonly found associated with the roots of many economically important plants, was rouse of many economically important plants, was studied under controlled conditions at different moisture levels. After 5 mo., population was highest at 20% moisture level. With further increase in the moisture nematode population decreased.—Copyright 1974, Biological Abstracts, Inc. W75-03832

CONTROL OF SALT-MARSH MOSQUITOES WITH ABATE INSECTICIDE AT COOMBABAH LAKES, QUEENSLAND, AUSTRALIA, Queensland Inst. of Medical Research, Herston

For primary bibliographic entry see Field 5G. W75-03836

EFFECT OF BIOTIC AND ABIOTIC FACTORS ON THE TOXICITY OF ENTOBACTERIN FOR LARVAE OF BLOOD-SUCKING MOSQUITOES AND BITING MIDGES, (IN RUSSIAN), Akademiya Nauk Kazakhskoi SSR, Alma-Ata. In-

stitut Zoologii.

O. G. Saubenova

Izv Akad Nauk Kaz SSR Ser Biol, Vol 5, p 26-30,

Identifiers: Aedes-aegypti, Aedes-caspius, Aedes-flavescens, Anopheles-hyrcanus, Culex-Havescens, Anopnetes-nyrcanus, Curex-modestus, Culex-pipiens, Culicoides-sp, Culiseta-alaskaensis, *Entobacterin, Larvae, *Midges, Mineralization, *Mosquitoes, Tabanus-sp, Tem-perature, *Toxicity, Water pollution effects, perature, Biota.

The toxic effect of the microbial preparation entobacterin was investigated on the larvae of blood-sucking mosquitoes and biting midges (Aedes caspius, A. aegypti, A. flavescens, Culex pipiens, C. modestus, Culiseta alaskaensis, Anopheles hyrcanus, Tabanus sp., Culicoides sp.). The effective-ness of the preparation was studied in relation to the effect of biotic and abiotic factors: species and age composition of the mosquitoes and midges, temperature regime, pH of the water, degree of its mineralization, and the detoxifying effect of the substrate. The use of entobacterin is most effective during the hot summer when the bodies of water are heated to 25-30C and the water in them have feeble mineralization with pH 7.0.--Copyright 1974, Biological Abstracts, Inc.

5D. Waste Treatment Processes

PRACTICAL TREATMENT OF FEEDLOT RU-

NOFF, Nebraska Univ., Lincoln. Water Resources

Available from the National Technical Informa-Avanage from the National Technical Information Service, Springfield, Va 22161 as PB-238 629, \$3.25 in paper copy, \$2.25 in microfiche. Completion Report, June 15, 1974. 18 p, 11 fig, 1 tab, 8 ref. OWRT A-027-NEB(6).

Group 5D—Waste Treatment Processes

Descriptors: Water quality, Runoff, *Feed lots, *Waste water treatment, *Farm wastes, *Biological treatment, *Aerobic treatment, Color, Adsorption, Design, Chemical oxygen demand, Soils, Agricultural runoff.

A field treatment system was designed, based upon the results of laboratory studies, to treat set-tled feedlot runoff. The system was operated at liquid retention times of one to four days. Routine data measurements included COD of the raw and treated wastes, influent, effluent, and mixed liquor suspended solids, organic and ammonia nitrogen, mixed liquor dissolved oxygen and effluent BOD. Laboratory studies of residual color removal by adsorption on soil columns were conducted. The soil columns ranged in depth from 3 to 6 feet and were loaded at rates ranging from one to four inches per day. Routine determinations of in-fluent and effluent COD and color were made. Conclusions were: (1) settled feedlot runoff may be effectively stabilized in an aerobic biological treatment system operated at a liquid retention time of two days; (2) the design parameters for such a system are similar to those of high-rate activated sludge; and (3) the humic color characteristic of feedlot runoff is effectively removed by adsorption on soil particles. W75-03313

EXPERIMENTAL OPTIMIZATION OF A STEP AERATION WASTE TREATMENT PROCESS, Kansas State Univ., Manhattan. Dept. of Chemi-

cal Engineering. G. C. Y. Chu, L. E. Erickson, and L. T. Fan. Biotechnology and Bioengineering, Vol XVI, p 231-250, 1974. 6 fig. 7 tab, 13 ref, (KWRRI Con-tribution No 117). OWRT A-045-KAN(8). 14-31-

Descriptors: *Activated sludge, *Waste water treatment, *Biological treatment, *Optimization, *Aeration, Chemical oxygen demand. Identifiers: Experimental optimization, Step aera-

Evolutionary operation (EVOP) was used to experimentally investigate the optimum steady state operating conditions for a step aeration activated sludge waste treatment process. A laboratory scale two tank step aeration activated sludge unit with fixed total volume, total influent flow rate, recycle flow rate, and sludge wasting rate was employe The volume ratio and flow rate ratio which minimized effluent chemical oxygen demand were determined. The results indicate that EVOP is a useful technique for improving the performance of biological processes. W75-03322

PURIFIED WASTEWATER-THE UNTAPPED WATER RESOURCE,

Envirotech Corp., Menlo Park, Calif. F. P. Sebastian.

Journal Water Pollution Control Federation, Vol 46, No 2, p 239-246, 1974. 3 fig, 3 tab, 21 ref.

Descriptors: *Waste water treatment, *Water supply development, Recycling, Water sources, Tertiary treatment, Annual costs, Capital, *Water

Purified wastewater has become an increasingly important source of water. A recent U.S. govern ment study of 155 communities with populations ment study of 155 communities with populations over 25,000 indicates, for example, that 145 presently have some raw waste in their water supplies. Several communities, including Windhock, South West Africa; Lake Tahoe, California; Colorado Springs, Colorado; and Rye Meads, U.K., have recently applied advanced waste treatment technology to boost existing tap, trout lake, swimming, irrigation, and industrial cooling water sunnies. Treatment plants for the respective community of the statement was the supplied of the suppli supplies. Treatment plants for the respective communities utilize biological-algae-physical-chemical, biological-physical-chemical, biological-physical-chemical, biological-physical-chemical, biological-physical-chemical

cal-chemical, and extended-biological techniques to meet required quality standards. Some earlier problems of wastewater reuse have been resolved. First, problems of dissolved solids buildup have not resulted because not all water is recycled. not resulted occase not all water is recycled. Second, a number of toxic materials present in wastewater are effectively eliminated in the advanced treatment stage. Third, potential hazards from viruses have been virtually nonexistent to this point. Cost estimates for the summarized advanced treatment methods indicate conventional primary-secondary-tertiary treatment is more expensive than independent physical-chemical treat-ment for similar effluent, although the latter is generally more expensive in producing water up to primary-secondary treatment quality. Potential benefits arising from the development of an advanced treatment potential, in addition to in-creased water supplies, are listed. (Schroeder-W75-03337

HOUSTON SUBURBS PROFITS FROM BUILDING THE STATE'S WASTEWATER TREAT-

Water and Sewage Works, Vol 121, Reference Number, p R38-R40, April 1974.

Descriptors: *Waste water treatment. *Tertiary treatment, *Pollution abatement, *Texas, Investment, Facilities, Regional development, *Treatment facilities, *Costs. development,

Identifiers: Montgomery County(Tex), Harris County(Tex), Houston(Tex).

While many communities point to the high costs in justifying their failure to utilize today's best water pollution abatement techniques, a Houston, Texas suburb has shown how a high quality, three stage sewage treatment plant can be profitable. The approach shows a way to insure adequate sewage reatment for future community needs while still not overburdening the present 1600 residents: in-stall a large advanced treatment plant, then sell exstall a large advanced treatment plant, then sell excess capacity to neighboring districts. Within two months of the plant's operation, the district has found buyers willing to pay \$308,000 to utilize 700,000 of the plant's 1 mgd capacity. This annual income significantly defrays the costs of equipment, land, engineering, and legal fees (\$400,000) and the 9.2 miles of sewage tank lines (\$800,000). Enture expansion is seen on the community's 20 Future expansion is seen on the community's 20 capacity serving the 200,000 people in Montgomery County and Harris County which includes Houston. The ingenuous approach has worked, providing citizens of the area with high quality ef-fluent which has equaled or bettered a 5 mg/l BOD and suspended solid levels, four times better than Texas' requirement and at a reasonable cost. (Schroeder-Wisconsin) W75-03340

BACTERIOLOGY OF CHLORINATED AND UNCHLORINATED WASTEWATER EF-

North Texas State Univ., Denton. Dept. of Biolog-

J. K. G. Silvey, R. L. Abshire, and W. J. Nunez. Journal Water Pollution Control Federation, Vol 46, No 9, p 2153-2162, September 1974. 1 fig, 7 tab,

Descriptors: *Chlorination, *Pathogenic bacteria, *Waste water treatment, Pollution abatement, waste water treatment, Politudon abatement, Streptococcus, Coliforms, Salmonellae, Biochemical oxygen demand, Dissolved oxygen, Microorganisms, Texas, Chlorine. Identifiers: Trinity River(Tex), Fecal coliforms, Nonfecal coliforms, Fecal streptococci.

Chlorination has not been widely practiced in the treatment of waste water although chlorination of finished water is standard procedure for the purpose of eliminating pathogenic bacteria. The current emphasis on curtailment of further massive

pollution of water by waste products has made necessary a re-evaluation of waste water treatment methods. A bacteriological and chemical study was made on part of the Trinity River in Texas. High numbers of fecal coliforms and fecal streptococci were attributed to the presence of waste effluents. Chlorination was effective in reducing the quantities of microorganisms only where the chlorine was directly applied. Bacterial populations recovered immediately after chlorination was ended. Decreasing susceptibility of microbial organisms to chlorine was, in this order: beneficial heterotrophic organisms, fecal coliforms, nonfecal coliforms and fecal streptococci. Chlorination did not effectively destroy Salmonellae. The BOD and DO of the effluent improved as a result of chlorination. The data obtained indicate that chlorination did not effectively improve the conditions of the river. (Orr-FIRL) W75-03366

LIQUID WASTE TREATMENT METHOD USING MICROORGANISM AS ADSORBENT (BISEIBUTSU O KYUCHAKUZAI TO SHITA HAISUI SHORIHO),

Gijutsu to Kagai, Vol 4, No 4, p 39-43, July 1974. 3

Descriptors: *Bacteria, *Mercury, *Adsorption, *Heavy metals, *Yeasts, Water pollution sources, Water treatment, Pollutants, Chlorella, Liquid wastes, Foreign research, Foreign countries, Waste water treatment, Degrada-tion(Decomposition), Microorganisms.

Identifiers: Japan, Saccharomyces cerevisiae,

Torulopsis utilis.

The use of a type of pseudomous bacteria for decomposition of organic mercury compounds was developed by the Fermentation Research Institute (the present Microbiol Industrial Technology Research Institute). Generally, continuous treatment of toxic heavy metals by this method is extremely difficult. Heavy metal ions are considered water pollutants because of their easy accumulation in living organisms. Research was performed on the ability of yeast, chlorella, and bactic their easy accumulation in the solicity of yeast, chlorella, and bactic their easy accumulation in the solicity of yeast, chlorella, and bactic their easy accumulation in the solicity of yeast, chlorella, and bactic their easy accumulations. teria to remove heavy metal ions, detergent, and dyes both by adsorption on the cell surfaces and by internal absorption. Saccharomyces cerevisiae (store bought bread yeast) and Torulopsis utilis (feed yeast) were used because of their easy accessibility. The results showed that depending on the bacterial cell, sodium, potassium, potassium bichromate and arsenic oxide were not adsorbed. but mercury, lead, cadmium, and other plus metal ions and aluminum ion were relatively well adsons and auminum ion were relatively well ac-sorbed. Basic dye, which turns into plus ion in a neutral solution, was adsorbed well, but acidic dye and catalytic dye were not. These physiochemical reactions are explained and their application for liquid waste treatment is discussed. However, at the present stage of research, the unsolved problems are too many, the cost of such a system is unfeasible, and the development of much less expensive microbial agents is not yet foreseeable. (Siegle-FIRL) W75-03367

DISINFECTION.

Texas Univ., Houston.
E. M. Davis, L. W. Whitehead, and J. D. Moore.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1181-1191, June 1974. 102 ref.

Descriptors: *Disinfection, *Reviews, Publications, Water supply, *Waste water treatment, Research and development, Patents, Research and development, Patents,
*Chlorination, Tertiary treatment,
*Bibliographies, Methodology, Kinetics, Filtration, Biological treatment.

The methodology and techniques developed and used in disinfection which have been reported in

Waste Treatment Processes—Group 5D

recent literature are reviewed. The need for increased attention in providing safe water supplies, adequately disinfecting waste water, and overall research is emphasized. Disinfection kinetics and chlorine research are highlighted. The possibility of using biological filtration and chlorination as tertiary treatment methods and the biological effects of chlorine are mentioned. Finally, three patent applications on disinfection are discussed. (Sandoski-FIRL) W75-03369

WATERLESS SANITATION FOR REST AREAS. Chrysler Corp., New Orleans, La. Space Div.

R. W. Fullerton. Water and Sewage Works, Vol 121, No 6, p 86-88, June 1974. 1 fig, 2 tab.

Descriptors: *Sewage disposal, *Sewerage, *Separation techniques, Treatment facilities, Domestic wastes, *Waste water treatment, Incineration. Identifiers: Mineral oil.

Since 1970, the Chrysler Corporation's Space Division has been developing marine and land based sewage disposal systems. One such system is a closed loop no-discharge nonbiological sewage disposal system which uses mineral oil as the flush fluid to transport human waste instead of water. The flushing fluid carries waste from conventional commodes to a separation tank where the sewage is separated by gravity. The fluid is filtered, purified, and reused indefinitely. Disposal is by burning in a pollution-free incinerator. (Sandoski-FIRL) W75-03370

ANAEROBIC DIGESTION OF ORGANIC MATTER,

Rowett Research Inst., Bucksburn (Scotland). P. N. Hobson, S. Bousfield, and R. Summers. Critical Reviews in Environmental Control, Vol 4, No 2, p 131-191, July 31, 1974. 6 fig, 197 ref.

Descriptors: *Reviews, *Anaerobic digestion, *Waste water treatment, Equipment, Model studies, Theoretical analysis, Bacteria, Biochemistry, *Organic matter, *Filters, Digestion, *Digestion tanks, *Bibliographies.

Identifiers: *Digester systems.

Treatment of waste products is of current concern. The biochemistry of anaerobic digestion is discussed with regard to anaerobic metabolism in the rumen and in digesters, to the composition of digester feedstocks, cellulose digestion, to digestion of nitrogenous and lipid materials, minor bacterial metabolites in digesters, effects of growth rate, substrate concentration, and pH, and fermentation. Theoretical digester systems and modeling of digester systems are presented with emphasis on the high rate digester, tow-stage ester, and the anaerobic filter system. The bacterial populations of anaerobic digesters and practical aspects of anaerobic digestion systems are mentioned. (Sandoski-FIRL) W75-03371

UNIQUE NEW SECONDARY OXYGEN TREAT-MENT SYSTEM FOR EFFLUENT.

Paper Trade Journal, Vol 158, No 31, p 22-23, August 5, 1974, 2 fig.

Descriptors: *Sewage treatment, *Waste water treatment, Water pollution, Chemical wastes, Pulp and paper wastes, Aeration, Activated sludge, Municipal wastes, Effluents, Industrial wastes, Oxidation, *Oxygenation, Activated sludge. Identifiers: Secondary oxygen treatment systems, Pipeline waterfall reactors, *Black liquor oxida-

A forced free-fall oxygenation (F3o) waste water treatment system has been developed by a unit of Airco Industrial Gases. This system is designed for municipal, chemical, pulp and paper waste usage. Conventional aeration tank capacity may be doubled or tripled by this system. It can also be used in conjunction with new activated sludge plants of existing operations. The waterfall principle is used in individual modular mixing and dissolving units. Also developed was a simple pipeline waterfall reactor useful in black liquor oxidation. (Leibowitz-FIRL) W75-03372

NEW CONCEPTS FOR CLARIFICATION OF WATER USING SOME ALTERNATIVES TO

WATER USING SOME ALIERWATIVES AND ALUM,
Regional Engineering Coll., Durgapur (India).
M. N. Rao, and A. K. Datta.
Journal of the Institution of Engineers (India), Vol
54, No PH2, p 57-60, February 1974. 5 fig, 12 ref.

Descriptors: *Water purification, *Alum, *Polyelectrolytes, *Magnesium carbonate, *Foaming, Coagulation, *Waste water treatment, Descriptors: Colloids, Bacteria, Dyes, Municipal water, Pota-

Identifiers: *Cationic polymers.

Alum has been fundamental in the clarification of municipal waste water for drinking purposes for centuries. The employment of alum as a coagulant in sophisticated water treatment plants is nearly universal. New concepts in the field of clarification of water recommend the use of polyelectrolytes, foam, and magnesium carbonate as alternatives to alum. Polyelectrolytes are polymers with only the cationic being used as prime coagulants. They exhibit a high charge density, and when added as a coagulant, the positively charged polymers are absorbed on the surface of the negatively charged colloidal impurities of water. The particle surface charged is reduced or used sufficiently to allow cohesion and aggregation on colli-sion. Foam has only a limited field of application in treatment of turbid water. A cationic surfactant in treatment of turbid water. A cationic surfactant is added to and mixed with the raw water, and passes to a flotation cylinder. The surfactants are both collector for the colloidal turbidity particles and frothing agent for carrying particles from the solution. When using magnesium carbonate as a coagulant, the sludge problem is often totally eliminated. (Leibowitz-FIRL) W75-03374

CONCENTRATION OF POLARISATION IN REVERSE OSMOSIS FLOW SYSTEMS UNDER LAMINAR CONDITIONS. EFFECT OF SUR-FACE ROUGHNESS AND FOULING, Birmingham Univ. (England). Dept. of Chemical Engineering.

Engineering.
J. W. Carter, G. Hoyland, and A. P. M. Hasting.
Chemical Engineering Science, Vol 29, No 7, p
1651-1658, 1974. 1 fig, 3 tab, 18 ref.

Descriptors: *Reverse osmosis, *Transition flow, *Membranes, Membrane processes, Fouling.
Identifiers: Cellulose acetate membranes, Distilled water fluxes, *Polarization, Rough membrane sur-

Experimentation in reverse osmosis was con-ducted under laminar flow conditions in a channel of cross-section 3.38 mm. Solution concentrations giving pi f/delta p up to 0.66 and cellulose acetate membranes having high rejections and distilled water fluxes of 12-15 x 0.0001 cm/sec were employed. A close prediction was made by a numeri-cal solution of the theoretical equations of the product fluxes and concentration polarization. The effects of rough membrane surfaces in increasing polarization and decreasing product flux were also predicted utilizing a roughness depth determined from a profile of the surface irregularities. A rust layer on the membrane surface had like effects on flux and polarization which were calculable. (Leibowitz-FIRL) TREATMENT OF WASTE-WATER CONTAIN-ING SURFACE ACTIVE SUBSTANCES, (IN JAPANESE),

K. Hagiwara, and Y. Murakami.

Bulletin of the Government Industrial Research Institute, Osaka, Vol 24, No 4, p 325-330, December 1973. 8 fig, 3 tab, 5 ref. English summa-

Descriptors: *Water pollution, *Waste water treat-Descriptors: water polaution, "waste water treat-ment, "Sludge disposal, Hydrogen ion concentra-tion, "Phenols, Iron, Aluminum. Identifiers: Polyhydric phenol, "Polysaccharose, Ethylene glycol molecules, "Surface active sub-stances, Ferric ion, Aluminum ion.

A condensed product of polyhydric phenol and polysaccharose was discovered to be effective for removal of nonionic surface active substances, in a new method of waste water treatment. This can also be used in the treatment of emulsified oil. The condensed product is added to waste water and ferric or aluminum ion is added as a coagulant, with the pH value of the solution adjusted to between 5 and 6. The solution is filtered and the sludge treated by a method such as burning. The treatment's efficiency is dependent upon the number of ethylene glycol molecules in the surface active substance. Efficiency decreases as the number of ethylene glycol molecules increases. The solubilities of the reaction product of the surface active substance and the condensed product of polyhydric phenol and polysaccharose inses as the ethylene glycol molecule increases. With the surface active substance at a concentration of 1,000 ppm, more than 90 percent of the surface active substance was removed. (Leibowitz-FIRL) W75-03376

UPFLOW FILTRATION IMPROVES OXIDA-TION POND EFFLUENT, Nebraska Univ., Lincoln. Engineering Research

T. J. McGhee, and R. K. Patterson. Water and Sewage Works, Vol 121, No 7, p 82-83, July 1974. 3 fig, 11 ref.

Descriptors: *Waste water treatment, *Oxidation lagoons, Effluents, Sewage treatment, Valuation lagoons, Effluents, Sewage treatment, Water quality control, *Filtration, *Biochemical oxygen demand, Coagulation, Alum, Flocculation, Aggregation, Polyelectrolytes, Algae, Industrial Identifiers: *Upflow filtration.

Oxidation ponds are an effective, uncomplicated and economical way of treating domestic sewage and certain industrial wastes. The system requires no skilled operator or maintenance. Through evaporation and seepage the total reduction in BOD through an oxidation pond can approach 95 percent, although the actual concentration of BOD and suspended solids may not meet the new standards of 30 mg/liter monthly average and 45 mg/liter weekly average determined for secondary treatment. The material which contributes to the BOD effluent and suspended solids of oxidation ponds is largely algal cells utilizing inorganic byproducts of the bacterial oxidation of the waste. Techniques listed for removal of algae include coagulation with alum, coagulation with alum and polyelectrolytes, flocculation and aggregation on cationic exchange resins, chlorine disinfection, anaerobic rock filters, fly ash slurry filtration, pressure filtration through a diatomaceous earth filter, and sand filtration. (Leibowitz-FIRL) W75-03377

LIME SLUDGE: SOME PROBLEMS-SOME

SOLUTIONS,
Grand Rapids Municipal Water Plant, Mich.
D. E. Hazelswatts. Water and Sewage Works, Vol 121, No 7, p 72-73, July 1974. 3 fig.

Group 5D—Waste Treatment Processes

Descriptors: *Waste water treatment, *Sludge, **Centrifuges, *Flocculant, Costs, Lime, *Michigan, Polymers, Water treatment, Identifiers: *Lime sludge, Grand Rapids(Mich), Grand River(Mich), Bird centrifuge, Nalco 'Instant' polymer.

The Grand Rapids municipally owned water system operates from two sources of supply, Lake Michigan and Grand River. Lime-softened river water produces 2260 pounds of solids per million gallons, producing at maximum rate 90,400 pounds of sludge per day. When the sludge was put in sewers to be dewatered, lime precipitates formed a pasty sludge heavier than sewage, causing the machinery to break down. After investigation, a Bird 36x72 inch solid bowl centrifuge with a spiral scraper was installed. Flocculant was injected through a 3/4 inch diameter pipe inside the feed pipe; however, results with the flocculant were no better than without; the flocculant pipe had broken. The baffle hole surrounding the flocculant pipe was enlarged; the machine is still operant. Because of problems of dissolving the sludge and also poor working conditions caused by the accumulation of the powdered flocculant on walkway surfaces, a new liquid flocculant was tried. The liquid flocculant proved as effective as the dry flocculant, but twice the amount was required. However, the cost of the required quantity of liquid is about half. Therefore the overall cost is the same, and the convenience and safety are much improved. The cake produced by the centrifuge is hauled to a driving yard. (Carpenter-W75-03378

TREATMENT FACILITY INCORPORATES UNIQUE DESIGN FEATURES,

Carollo (John) Engineers, Santa Ana, Calif.

Public Works, Vol 105, No 9, p 106-107, September 1974. 3 fig.

Descriptors: *Waste water treatment, Facilities, Descriptors. Waste water treatment, Facilities, *Design, Digestion, Flow rates, Sedimentation, Operation and maintenance, *California, Municipal wastes, *Treatment facilities, *Anaerobic

Identifiers: *Degasification, Peaking ponds, Redlands(Calif).

The city of Redlands, California, is currently upgrading and increasing the capacity of their existing waste water treatment facilities. Two unique design features of the new system include a digester supernatant degasification facility allow further concentration of supernatant follow-ing high rate primary-secondary anaerobic digestion and a peaking pond to limit peak flow rates to existing secondary treatment facilities and to third-stage ammonia conversion facilities. The new facilities are two rectangular tanks with a bot-tom width of 21 feet and length of 11 feet, side slopes at 3 to 1 covered with 4 inches of concrete, a normal working depth of 6 feet, and 2 feet of freeboard. A decant box pump at one end, with a scumbaffle and adjustable overflow weir, return the decanted liquid to the plant influent flow. A sump at the opposite end from the decant box col-lects the concentrated sludge. Effects of the facilities which have not yet been evaluated include: optimum process control of third stage biological facilities due to more uniform flow rates; greater effluent solids control caused by reduction of peak flow rates on second and third-stage sedimentation facilities; equalization of organic loadings; and, operational flexibility. (Orr-FIRL) W75-03379

BACTERIAL PRODUCTION OF ENZYMES IN

BACTERIAL PRODUCTION OF ENZYMES IN ACTIVATED SLUDGE SYSTEMS, Connecticut Agricultural Experiment Station, New Haven. Dept. of Biochemistry.

L. Handin, and D. C. Sands.

Journal Water Pollution Control Federation, Vol

46, No 8, p 2015-2025, August 1974. 14 tab, 14 ref.

*Sludge treatment, *Waste water Descriptors: *Activated sludge, treatment, Microbial *Bacteria, *Activated sludge, *Biological treatment, Microbial Sludge, Effluents, Biodegradation, treatment. *Enzymes. degradation, Microorganisms, Treatment facilities

The five important stages (raw influent, primary effluent, mixed liquor, activated sludge, final ef-fluent) in four activated sludge treatment facilities were examined to determine the numbers and percentages of bacteria capable of producing specific enzymes. The activated sludge contained the greatest total number of bacteria, followed by the number in the mixed liquor. A 17- to 93-fold in-crease was evident between raw influent and mixed liquor and activated sludge. There is not a selective removal of any one specific bacterial type in the primary effluent stage. From the primary effluent to the mixed liquor stage, a selective process seems to occur which favors bacteria with certain enzymatic capabilities. Bacteria in enzyme categories not readily precipitated in the sludge appear in higher numbers in the final effluent. The fact that the increase of bacteria from the mixed liquor and the activated sludge was not greater than was found may indicate that activated sludge contains more undegraded material than bacterial cells or, if the sludge is predominately bacteria, that they are dead cells. The lack of significant difference between these two stages may mean that the percentage of active bacteria tends to equalize in the aeration step. The information obtained could be useful when considering the possible use of stabilized enzymes in lieu of, or in addition to, microorganisms. (Orr-FIRL) W75-03380

COMPARISON OF COMPLETELY MIXED AND PLUG FLOW BIOLOGICAL SYSTEMS.

Fehr and Graham Consulting Engineers, Freeport,

E. D. Toerber, W. L. Paulson, and H. S. Smith. Journal Water Pollution Control Federation, Vol 46, No 8, p 1995-2014, August 1974. 26 fig, 9 tab, 3

Descriptors: *Activated sludge, *Waste water treatment, Evaluation, Flow rates, Organic load ing, Construction, Design, Illinois, Biochemical oxygen demand, Chemical oxygen demand, Biological treatment.

The performance of a completely mixed activated sludge system and the performance of a plug flow system under parallel operating conditions were compared. The two systems were tested with waste from Freeport, Illinois. Under normal operating conditions both the completely mixed and the plug flow systems had similar removal efficiencies. If there were separate operating conditions and constant influent flow rates, both systems showed a rapid leveling off of removal efficiency after a nominal aeration detention time of 2 to 3 hours. The completely mixed system exhibited an overall removal efficiency ten percent greater than the plug flow system when both were subjected to a severe shock load. (Orr-FIRL) W75-03381

HIGH RATE BIOLOGICAL DENITRIFICATION USING A GRANULAR FLUIDIZED BED, Manhattan Coll., Bronx, N.Y. Dept. of Civil En-

gineering.
J. S. Jeris, C. Beer, and J. A. Mueller.

Journal Water Pollution Control Federation, Vol 46, No 9, p 2118-2128, September, 1974. 11 fig, 4 tab, 11 ref.

Descriptors: *Biological treatment, *Activated sludge, *Carbon, *Nitrogen, Research and sludge, *Carbon, *Nitrogen, Research and development, Microorganisms, Microbial degradation, Equipment, Trickling filters, *Waste water treatment,
*Denitrification. Identifiers: Granular fluidized bed.

Identifiers: Completely mixed system, Plug flow.

Using fluidized, small media for biological removal of contaminants in a reactor has the advantages of greater surface area available for growth per unit of reactor volume, very small head loss, no danger of clogging, and easier carrier removal procedure. A fluidized bed is a solid, granular carrier medium in a columnar reactor suspended in an upflowing fluid. An experimental apparatus was designed and tested for denitrifica-tion capabilities. A major problem with the process was the continual growth of the organisms on the carbon particles. This caused bed expansion and necessitated the removal of part of the biologically coated carbon to prevent bed overflow. The idea of achieving a balance between growth and washoff similar to that found in a trickling filter was dropped because increasing the flow failed to affect the growth on the media. It was estimated that the chemical costs would be slightly over \$0.02/1000 gal for removal of 25 mg/liter nitrate nitrogen. The nitrogen removals obtained ranged ntrogen. The introgen removals obtained ranged from 257 to 424 lb inorganic nitrogen/ day/1000 cu ft of reactor capacity. When the hydraulic loading was 12 gpm/sq ft, the superficial detention time required was about seven minutes for removal of 20 to 35 mg/liter nitrogen. The fluidized biological bed concept has demonstrated the ability remove more nitrogen than the activated sludge process and requires less detention time than other biological waste treatment systems. (Orr-FIRL) W75-03382

COMBINED CHEMICAL-BIOLOGICAL TREATMENT STUDIES,
Institute for Water and Air Pollution Research,

Stockholm (Sweden).

H. O. Bouveng. Pure and Applied Chemistry, Vol 37, No 3, p 329-341, 1974. 10 fig.

Descriptors: *Sewage treatment, *Biological treatment, Chemical precipitation, Phosphorus, Biochemical oxygen demand, *Waste water treatment, Costs, Municipal wastes, Industrial wastes. Identifiers: *Chemical-biological treatment.

The OECD study of chemical treatment of urban sewage is discussed with special reference to the relation between cost and performance of alternative processes. The application of combined chemical and biological treatment processes is discussed with emphasis on the factors which influence the stability of performance. Considering chemical treatment of urban sewage only as a method for phosphorus removal is an unjustified limitation of its application. Chemical precipitation of urban sewage is a profitable alternative when an effluent having a low and stable level of residual BOD is desired. Chemical treatment is a useful supplement to biological treatment of industrial waste water when the latter is not able to achieve the required effluent quality. (Orr-FIRL) W75-03383

MEMBRANES AND MODULES FOR THE WATER DESALINATION WITH REVERSE OSMOSIS (MEMBRANEN UND MODULE FUR DIE WASSERENTSLZUNG MIT UMGEKEHRTER

For primary bibliographic entry see Field 3A. W75-03384

DESALINATION - NEW WATER FOR OLD (ENTSALZUNG-FRISCHWASSERVERSOR-GUNG UND ABWASSERAUFBEREITUNG),

United Kingdom Atomic Energy Authority, London (England).

Meerestechnik, Vol 5, No 4, p 119-123, August,

Descriptors: *Desalination. *Potable *Reverse osmosis, *Waste water treatment, Distillation, Water quality control, Water resources,

Waste Treatment Processes—Group 5D

Previously desalination has been used to provide an essential commodity for man--potable water. The newer desalting processes are becoming more important in waste treatment. Desalination technology, which has been mainly distillation processes, contributes to only one aspect of the complete water cycle. The advent of the reverseosmosis system introduces the technology to the area of protection of clean water resources from the discharge of polluting waste. Reverse-osmosis can also be used for the renovation of waste water. (Orr-FIRL)

ADSORPTION PROCESSES,

Michigan Univ., Ann Arbor. Coll. of Engineering. W. J. Weber.

Pure and Applied Chemistry, Vol 37, No 3, p 375-392, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: *Waste water treatment, *Adsorption, *Activated carbon, Water reuse, Costs, Municipal wastes, Effluents, Organic loading, Toxicity, Heavy metals, Phosphorus, Design, Operation and maintenance. Identifiers: *Physicochemical treatment.

Adsorption is a basic process in the physiochemical treatment of municipal waste water. This treat-ment can economically meet the higher effluent standards and water reuse requirements of today. Activated carbon is the most effective adsorbent for this method. Expanded-bed contact systems are the most efficient means for utilizing granular carbon for waste treatment. Augmentation of the adsorption process occurs as an in-situ partial regeneration resulting from biological growth on the surfaces of the carbon. The system produces high levels of treatment and has a high degree of stability and reliability. It is very resistant to shock loads and toxic waste constituents. The advantages of a physicochemical system over a biological system include: less land is required; a lower sensitivity to diurnal variation exists; it is unaffected by toxic substances; and the former has a potential for significant removal of heavy metals. In addition, a physicochemical system gives excellent removal of phosphates and organic waste constituents and greater flexibility in design and operation. (Orr-FIRL)
W75-03386

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I, Kansas State Univ., Manhattan. Dept. of Industri-

al Engineering. P. K. Misra.

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as PB-238 146, \$7.00 in paper copy, \$2.25 in microfiche. Kan-sas Water Resources Research Institute, Manhat-tan, 1971. 162 p, 34 fig, 20 tab, 118 equ. OWRT A-

Descriptors: *Water quality, Streams, *Waste water treatment, *Estimating, *Filters, Dynamic programming, Measurement, Systems analysis, Equations, Mathematical models, Simulation analysis, Algorithms, *Filtration.

Identifiers: Linear estimation theory, Nonlinear

processes, Accuracy, Kalman filters, Invariant imbedding filters.

This is Part I of a Doctoral Thesis which demonstrates that linear and nonlinear estimation theory can be used successfully in the identification of states and parameters in a conceptual model of a dynamic physical process. In this first part, stream quality and waste water treatment processes are examined. A two-dimensional stream quality model is used to investigate linear estimation theory; for nonlinear theory, nonlinearity is en-tered either through the process dynamics model or through an arc-tan measurement model. Out of

eight filters studied, two result for linear systems: the Kalman and the invariant imbedding. It is concluded that although the invariant imbedding filter is simpler in its derivation, the Kalman filter's performance is significantly better. Nonlinear process dynamics with linear measurement models results in three different filters - linearized Kalman, invariant imbedding or dynamic programming, and a rirst-order minimal variance filter; the latter proves best regarding estimation accuracy. Finally, the nonlinear dynamics coupled with the nonlinear measurement scheme yields all eight filters. Again, the first-order minimal variance is proved to be the best. (See also W75-03388) (Bell-Cornell)

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II,

Kansas State Univ., Manhattan. Dept. of Industrial Engineering.

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as PB-238 599, \$7.00 in paper copy, \$2.25 in microfiche. Kan-sas Water Resources Research Institute, Manhat-tan, 1971. 186 p, 37 fig, 5 tab, 145 equ, 286 ref. OWRT A-048-KAN(2).

Descriptors: *Model studies, Hydrologic systems, *Chemical reactions, *Waste water treatment, Activated sludge, Streams, Optimization, Water quality, *Estimating, Measurement, Simulation analysis, *Filters, Equations, Systems analysis, *Filtration.

Identifiers: Linear estimation theory, Nonlinear estimation theory, Process dynamics, Physical processes, Optimal weighting function, Sensitivity analysis, Search techniques, Parametric analysis, *Convergence, Accuracy, Invariant imbedding fil-

This is Part II of a Doctoral Thesis which demonstrates that linear and nonlinear estimation theory can be used successfully in the identification of states and parameters in a conceptual model of a dynamic physical process. In this second part, aste water treatment, hydrologic system, chemical reaction processes are examined. Considered is convergence, an important criteria for any sequential scheme; convergence depends highly on the initialization of certain parameters, the estimation of which is not simple (for practical problems). Two algorithms are developed to improve the convergence of filters. One employs a search' technique to determine the optimal initial conditions, and the other uses a local sensitivity concept to achieve the same end result. It is demonstrated that states and parameters of a waste water treatment process and a hydrologic model can be estimated effectively using a first-order minimal variance filter; this strengthens the applicability of the estimation theory to dynamic systems. Because of the wide range of applicability of the invariant imbedding concept, computa-tional improvements have been suggested for the invariant imbedding filter; these can be applied equally well to all filters. (See also W75-03387) (Bell-Cornell) W75-03388

ARGONNE NATIONAL LABORATORY. WASTE MANAGEMENT PROGRAMS QUAR-TERLY REPORT, OCTOBER-DECEMBER 1973, Argonne National Lab., Ill.

M. J. Steindler, N. M. Levitz, L. E. Trevorrow, T. J. Gerding, and B. J. Kullen.

Available from the National Technical Informa tion Service, Springfield, Va. 22161, as Rept. No ANL-8087, \$4.00 in paper copy, \$2.25 in microfiche. Report No ANL-8087, February 1974. 45 p, 3 fig, 7 tab, 144 ref, append.

Descriptors: *Radioactive wastes, Water pollution sources, *Nuclear wastes, Nuclear powerplants,

Fuels, *Plutonium, Fuels, *Radioactivity effects, Radiochemical analysis, Research and development, Water pollution treatment, Tritium, Hydrogen, Water, Separation techniques, Waste storage, Reverse osmosis, Membrane processes, Transport, Economics.

Identifiers: management, reprocessing, *Zircaloy.

Metal-compaction methods have been reviewed and information on the irradiation-induced proper-ty changes of Zircaloy surveyed as part of a study on the handling of fuel cladding hulls. Information originating from AEC-site visits and from a review of the open literature concerning decontamination of plutonium-contaminated materials is presented. The technical and economic feasibility of adapting reverse osmosis to the concentration of tritium from tritiated fuel reprocessing wastes was briefly evaluated. Technical feasibility was assumed from literature reports of a difference of about 3% in the self-diffusion coefficients of THO and H2O, and possibly greater differences in transport rates in solution-diffusion membranes. The costs of such a process werw calculated. The result ranged from 10(-4) to 1 mill/kWh of nuclear power, depending on the assumed single-stage separation factor and whether tritium-depleted water was recycled to the reprocessing plant. (See W75-03416 thru W75-03418) (Houser-ORNL) W75-03415

CONSOLIDATION TECHNIQUES FOR FUEL CLADDING HULLS,

Argonne National Lab., Ill. N. M. Levitz, and B. J. Kullen.

In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December, 1973. Report No ANL-8087, p 3-12, February 1974. 2 fig, 4 tab.

Descriptors: Management, *Nuclear wastes, *Water pollution sources, *Fuels, *Radioactivity, *Zirconium, Compaction, Contaminants, *Waste treatment, Waste storage, Waste disposal, Alloys, Consolidation, Compressibility, costs, Economics, Transportation. Comparative Identifiers: Fuel reprocessing wastes, *Zircaloy.

The studies in this program involve (1) characterization of waste Zircaloy hulls from the chop-leach processing of spent water cooled reactor (LWR) fuel; (2) review of experience with pyrophoricity of Zircaloy and related hull-handling rections of (2) having of properties. pyrophoretry of Encady and related nurrianding practice; and (3) review of mechanical-compaction experience and related problems. Work in this quarter has been on the review of compaction quarter has been on the review of compaction methods and the properties of zirconium that could adversely affect the safety of compaction processes. The review will be the basis of an evaluation of compaction methods and the development of an experimental program to obtain data that are not available in the literature or are of uncertain quality. The primary incentive for compacting Zircaloy hulls is the economic savings gained by volume reduction. Information in the literature indicates that this reduction in volume would result in cost savings for containers, interim would result in cost savings for containers, interim storage, shipment, and ultimate storage/disposal. (See also W75-03415) (Houser-ORNL.) W75-03416

SALVAGE OF ALPHA-CONTAMINATED

METALS, Argonne National Lab., Ill.

M. J. Steindler, and T. J. Gerding.
In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December 1973. Report No NAL-8087, p 13-19, February 1974.

Descriptors: Management, *Nuclear wastes, *Plutonium, *Waste treatment, *Waste storage, Separation techniques, Research and development, Water pollution sources, Nuclear power plants, Equipment, Apparatus, Tools, Materials, *Metals, Acids, Radioactive wastes.

Group 5D—Waste Treatment Processes

Identifiers: Retrievable storage, Decontamination, Waste burial.

The extensive operations in AEC facilities that handle plutonium have resulted in the accumula-tion of large quantities of waste contaminated by alpha-active elements, particularly plutonium. Although much of this waste is combustible and can also be reduced in volume by compaction, a significant volume of waste is in the form of metal-lic equipment such as machinery, tools, enclosures, etc. The program concerns methods by which these metals can be salvaged. The effort during the present period has been directed toward a review of existing information on the decontamination of metals. The results of this review are summarized. (See also W75-03415) (Houser-W75-03417

STORAGE OF TRITIUM AND NOBLE GASES, Argonne National Lab., Ill. L. E. Trevorrow.

In: Argonne National Laboratory Waste Management Programs Quarterly Report, October-December, 1973. Report No ANL-8087, p 20-29, February 1974. 1 fig, 3 tab.

Descriptors: *Waste treatment, *Nuclear wastes, *Tritium, Separation techniques, Research and development, Water pollution sources, *Reverse osmosis, *Membrane processes, Radioactivity, Hazards, Safety factor, Storage, Fuels, Public health, Costs, Economics, Regulation, Legal aspects, Governments, Administrative agencies. Identifiers: *Fuel reprocessing wastes, *Noble

The objective is to evaluate various techniques for the storage of tritium and noble gas fission products. The scope of the program includes evaluations of proposed storage techniques and techniques for the concentration of the desired nuclides. Recent efforts have included evaluations of proposed techniques for concentrating tritiated wastes. An Evaluation is presented of the possi-bility of concentrating tritiated water by reverse osmosis (RO). (See also W75-03415) (Houser-ORNL) W75-03418

TRANSURANIC SOLID WASTE MANAGE-MENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974. Los Alamos Scientific Lab., N. Mex. For primary bibliographic entry see Field 5A. W75-03420

RECOMMENDED METHODS OF REDUCTION, NEUTRALIZATION, RECOVERY, OR DISPOSAL OF HAZARDOUS WASTE, VOLUME IX, NATIONAL DISPOSAL SITE CANDIDATE
WASTE STREAM CONSTITUENT PROFILE
REPORTS - RADIOACTIVE MATERIALS,

TRW Systems Group, Redondo Beach, Calif. R. S. Ottinger, J. L. Blumenthal, D. F. Dal Porto,

R. S. Ottinger, J. L. Blumentnat, D. F. Dai Porto, G. I. Gruber, and M. J. Santy. Available from NTIS, Springfield, Va, 22161 as PB-224 588, \$6.25 in paper copy, \$2.25 in microfiche. Rept No EPA-670/2-73-053-i, August 1973. 166 p, 1 fig, 35 tab, 124 ref.

Descriptors: Radioactivity, Materials, *Radioactive waste disposal, *Profiles, Physical properties, Chemical properties, *Waste treatment, *Waste storage, Radioisotopes, Carbon, Cobalt, Ruthenium, Promethium, Strontium, Zirconium, Niobium, Iridium, Radium, Cesium, Hydrogen, Iodine, Krypton, Xenon, Plutonium, Americium, Curium, Cerium.
Identifiers: Alternative methods.

Summary information and evaluation of waste management methods in the form of Profile Re-ports for radioactive materials are presented.

These Profile Reports were prepared for either a particular hazardous waste stream constituent or a group of related constituents. Each Profile Report contains a discussion of the general characteristics of the waste stream constituents, their toxicology and other associated hazards, the definition of adequate management for the waste material, an evaluation of the current waste management practices with regard to their adequacy, and recommendation as to the most appropriate processing methods available and whether the waste material should be considered as a candidate for National Disposal, Industrial Disposal, or Municipal Disposal, (Houser-ORNL)

GUIDELINES FOR THE INTERIM STORAGE OF AEC-GENERATED SOLID TRANSURANIC WASTES.

Los Alamos Scientific Lab., N. Mex.

Available from NTIS, Springfield, Va 22161 as Rept No LA-5645, \$5.45 in paper copy, \$2.25 in microfiche. Report No LA-5645, June 1974. 70 p, 1 tab. 12 ref.

Descriptors: *Radioactive waste disposal, Wastes, Management, Management, *Waste storage, Technology, *Safety, Safety factors, Evaluation, Assessment, *Waste disposal, Solid wastes, *Waste treatment.
Identifiers: Guidelines, *Transuranic wastes, Retrievable storage.

Guidelines have been developed to provide a basis against which to judge the adequacy of techniques and methods for the retrievable storage of AECgenerated transuranic-contaminated solid wastes. These guidelines apply to operations for packaging, handling, and storage of such wastes. Each guideline has been fully discussed with emphasis on the reasoning behind the guideline statement, problems that should be considered in developing a storage facility, and methods currently in use at AEC installations. (Houser-ORNL.)

W75-03430

WATER TREATMENT PLANT WASTES

DISPOSAL-PART 2, G. P. Westerhoff, and M. P. Daly. Journal American Water Works Association, Vol 66, No 6, p 379-384, June 1974. 3 fig, 6 tab, 5 ref.

Descriptors: *Waste water treatment. *Waste disposal, *Sludge treatment, *Vasale water treatment, *Vasale disposal, *Sludge treatment, *Sludge disposal, Filtration, Coagulation, Centrifugation, Chemical precipitation, Evaluation.

Identifiers: *Alum.

The available alum-sludge treatment and disposal methods were evaluated by pilot plant studies so that the Sturgeon Point Water Treatment Plant could be improved in accordance with the Federal Water Pollution Control Act Amendments of 1972. Processes evaluated included alum recovery, recycling of recovered alum, pressure filtration, scroll centrifugation, basket centrifugation, vacuum filtration, chemical coagulation, a belt-filter-press system, and artificial freeze-thaw. The processes or combinations of processes most feasible at the Sturgeon Point Plant are pressure filtration, precoat rotary-vacuum filtration, scrool centrifugation, freeze-thaw plus vacuum filtration, and alum recovery plus horizontal vacuum filtra-tion. (See also W74-13284) (Orr-FIRL) W75-03444

TEMPERATURE-SUBSTRATE INTERACTIONS

IN BIOLOGICAL TREATMENT,
Missouri Univ., Columbia. Dept. of Civil En-

gineering. J. T. Novak.

Journal Water Pollution Control Federation, Vol 46, No 8, p 1984-1994, August 1974. 12 fig, 3 tab,

Descriptors: *Biological treatment, *Waste water treatment, Kinetics, *Aerobic treatment, *Anaerobic treatment, Temperature. Identifiers: Arrhenius equation.

Temperature correction factors are used in biological waste treatment processes to modify microorganism growth rates or substrate utilization rates to correspond to variations in the temperature. The modified Arrhenius equation is usually used to characterize the temperature correction for these modifications. The temperature response of biological processes was found to depend on the substrate concentration present in the system. Therefore, the applicability of the Arrhenius equation is limited because one of its factors (the temperature coefficient) is substrate dependent. Aero-bic processes were nearly independent of temperature variations at low substrate levels and anaerobic processes were dependent on temperature at all substrate levels. Although temperature models provided reasonable descriptions of process response, they must be used with care, keeping in mind the fact that temperature can affect the organism yield coefficient and decay rate, the dominant organism groups and the availability of nutrients, which in turn can alter the kinetic response. The following basic temperature model clarifies the temperature-substrate relationships present in biological waste treatment systems: for aerobic degradation both k and Ks increase logarithmically with increased temperature; for anaerobic decay k increases logarithmically with increased temperature and Ks decreases logarithmically with increased temperature. (Orr-W75-03445

WASTEWATER DEGASSING BY ADIABATIC FLASHING,

New Mexico State Univ., University Park. Dept.

of Chemical Engineering. D. B. Wilson, and H. Y. Tsao.

Journal Water Pollution Control Federation, Vol 46, No 9, p 2209-2214, September, 1974. 3 fig, 3 tab, 11 ref.

Descriptors: *Separation techniques, *Flash distillation, *Waste water treatment, Gases, Aqueous solutions, Industrial wastes, Domestic wastes, Equipment, Costs, Economics, Mathematical studies. Algorithms. Identifiers: *Adiabatic flashing.

Aqueous solutions of dissolved gases can result from a variety of industrial and water treatment operations such as the production of oil from petroleum, domestic waste water treatment, petroleum refining, hydroelectric production, fish-farming operations, and the scrubbing of power plant stack gases. The dissolved gases must be removed before the water is released to the environment if the gaseous components are corrosive or toxic to the biological life in the water system. These gases can be physically separated either by stripping or flashing. Adiabatic flashing is recommended because the equipment is relatively simple, a short residence time for phase separation is provided and eliminates mist entrainment, the gaseous solute produced is in a high concentration, and the discharge temperature of the water steam is lowered. A mathematical analysis of adiabatic flashing was performed. The analysis indicated that if the quantity and condition of the feed, adiabatic operation, and the flash tempera-ture are specified, all the other design variables may be calculated by using the system material and energy balances. The design variables include the pressure of the flash, and the ratio of the quan-tity of gas phase produced to the quantity of feed. The recommendation of adiabatic flashing is based on the results of the analysis, an estimation of economic costs based on equipment prices, and estimated operating costs. (Orr-FIRL) W75-03446

Waste Treatment Processes—Group 5D

METHOD AND APPARATUS FOR RECOVER-ING A SUBSTANCE FLOATING AS A SHEET ON THE SURFACE OF A LIQUID MASS, Societe Bertin et Cie, Paris (France). For primary bibliographic entry see Field 5G. W75-03449

A PROGRAM FOR THE FUTURE-WATER AND SEWER IN RURAL AMERICA. Commission on Rural Water, Washington, D.C. April 1974. 20 p, 22 photo.

Descriptors: *Sewage, *Sewage treatment, *Water quality control, Water pollution sources, *Groundwater resources, Virginia, West Virginia, South Carolina, Arkansas, New Mexico, Florida, Water pollution control, *Waste water treatment, Water supply, Water wells, Water table, Water resources, Potable water, Water quality, Federal government, State governments, Water pollution.

Providing an adequate water supply is a major problem for rural communities in America. Studies conducted by various federal agencies show extensive contamination of rural public water sources as well as private water sources. Contamination usually results from improper septic fields. The National Demonstration Water Project (NDWP) was an outgrowth of the Demonstration Water Project (DWP). DWP was set up to supply water to five rural counties near Roanoke, Vir-. The Roanoke project was very successful, so the Office of Economic Opportunity established a similar national program in 1971. NDWP has six affiliate projects in Virginia, West Virginia, South Carolina, Arkansas, New Mexico and Florida. The purpose of NDWP is to design and test models of rural water-sewer projects, to gather and disseminate information and technical expertise, and to expand water-sewer facilities in rural areas. The NDWP includes coordination and project assistance, research and publications, an information clearing house and a management and technical assistance program. (Barnes-Florida)

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE. Florida Univ., Gainesville. Coll. of Law For primary bibliographic entry see Field 4B. W75-03489

THE USE OF POLLUTANTS FOR AQUACUL-TURE - CONDITIONING OF WASTES FOR AQUACULTURE,
Papua and New Guinea Univ., Port Moresby (New

G. L. Chan.

In: Indo-Pacific Fisheries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 84-91. 2 fig.

Descriptors: *Farm wastes, *Sewage treatment, Algae, Self purification, *Aquiculture, Organic wastes, *Domestic wastes, *Biodegradation, Sewage disposal, Aquatic microorganisms, Bacteria, Environmental sanitation, *Biological treatment, Water reuse, Biochemical oxygen demand, Fertilization, *Waste water treatment.

The conditioning of human and animal wastes for The conditioning of human and animal wastes for use in aquaculture is described. The processes are sanitary and scientific and produce as by-products, fuel such as methane gas, feed in the form of algae, and plant fertilizer. The organic matter is digested by bacteria, producing methane, allowing the settling of cellulose and destroying parasites. The effluent is then further purified by algae. At this stage the effluent is then further purified by algae. At this stage the effluent may be used in aquaculture. The water finally leaving the system will contain only minerals. A design for the unit is presented. (Katz) unit is presented. (Katz)

SEWAGE AND AQUACULTURAL PRODUC-TION, Victoria Univ., Wellington (New Zealand).

In: Indo-Pacific Fisheries Council Proceedings, 18: Indo-racine Pisneries Council Proceedings, 15th Session, Wellington, New Zealand, October 18-27, 1972. Section II: Coastal Aquaculture and Environment, Bangkok, 1974. p 70-75, 17 ref.

*Salmonids, Descriptors: *Aquiculture, *Sewage Fertilization. treatment. *Biodegradation, *Waste water treatment, Rainbow trout, Water reuse, Sewage lagoons, Farm wastes, Smelts, Sewage effluents, Sewage disposal, Food chains, *Tertiary treatment. Sewage Identifiers: Goldfish.

Experiments on a sewage stabilization pond are described in which rainbow trout have been successfully cultivated together with wild goldfish, eels, and common smelt. Weight gains of up to twenty-fold for rainbow trout in a six-month period and thirty fold for the goldfish have been obtained in a ten-month period. The author suggests the need for changing the attitude toward sewage wastes and in particular their effect on the environment of rainbow trout and other salmonids. (Katz)

MUNICIPAL WASTES - A DESIGN FOR AN IN-TEGRATED PLANT TO MAKE A PROFIT, New South Wales Univ., Kensington (Australia).

School of Chemical Engineering.

C. H. Hunt, and R. F. Terpstra. Australian Chemical Engineering, Vol 15, No 9, p 9-16, September 1974. 4 tab, 15 ref.

Descriptors: *Municipal wastes, *Waste disposal, *Water reuse, Economics, *Australia, Sludge disposal, Sewage disposal, Alcohols, Recycling, *Costs, Profit, Cities, Cellulose, Capital costs.

The currently accepted methods of garbage disposal in Australia - dumping and burial - are rapidly becoming unacceptable both in terms of cost and environmental quality. A plan suitable for garbage disposal for a city of about 400,000 people is proposed whereby cellulose pulp extracted from refuse is used as a raw material for acid hydroly-sis, fermentation and distillation to yield ethyl alcohol. The water requirements for the plant are provided by sewage water purification, and the sludge derived from water treatment at the input and output stages may be dried and used as fuel for the plant. On the basis of market prices in 1972-3, and allowing for capital and fixed costs, it is estimated that a profit of about \$15 per ton of refuse treated could result from the sale of ethyl alcohol and other reclaimed materials such as crushed glass, metals and plastics, and fertilizers. (Levick-CSIRO)

ALUM RECOVERY FROM WATER AND WASTEWATER TREATMENT PLANT SLUDGES,

Virginia Polytechnic Inst. and State Univ., Blacksburg. B. H. H. Chen.

Available from Xerox University Microfilms, Ann Arbor, Mich. 48106, Order No 74-14,485. PhD Thesis, 1974, 146 p.

Descriptors: Investigations, Alum, *Sludge treatment, Economics, *Waste water treatment, Treatment facilities, Hydrogen ion concentration, *Water treatment.

Identifiers: *Alum recovery.

The extent of alum recovery achievable is defined, the effectiveness of recovered alum is demonstrated, and the properties of the remaining sludge are characterized. The economy of the alum recovery process in water and waste water treatment systems was also analyzed. Results showed that the amount of alum recovered can be controlled by noting the associated stoichiometric relationship and by pH measurement. An exten-sive cost analysis of the alum recovery technique developed in the laboratory was conducted with two illustrative problems demonstrating the economic advantage of this recovery process. Alum recovery and reuse may be a viable alternative to the conventional method of water and waste water treatment. (Sandoski-FIRL) W75-03542

SOME EFFECTS OF NITROGEN AND PHOSPHORUS LIMITATION ON A BIOLOGICAL-CHEMICAL WASTEWATER TREAT-MENT PROCESS.

Michigan Univ., Ann Arbor.

Available from Xerox University Microfilms, Ann Arbor, Mich 48106, Order No 74-15,908. PhD Thesis, 1973, 219 p.

Descriptors: *Nitrogen, *Phosphorus, *Waste water treatment, *Waste treatment, *Biological treatment, Treatment facilities, Sludge treatment, Activated sludge, Laboratory tests, Efficiencies. Identifiers: *Chemical treatment, Charge produc-

The effect of nitrogen and phosphorus limitation on substrate removal, sludge productivity, biochemical behavior of sludge, and capsule and electric charge production on the surface of treatment organisms has been studied using two laboratory activated sludge units with heterogeneous populations. Experimental results indicate that the treatment efficiency of the biological-chemical process is highly dependent on the chemical nature of the waste to be treated. Also, an increase in sludge protein and sludge phosphorus content was observed as the sludge yield and carbohydrate content decrease. Finally, results of chemical flocculation studies showed that lower chemical doses per unit of effluent biological solids were required at high initial solids and low initial phosphorus conditions. The relationship between quantity of chemical precipitant and percentage of phosphorus removal was not a stoichiometric function. Indications are that following phosphorus removal there is a chemical separation of dispersed microorganisms. (Sandoski-FIRL) W75-03543

THE SEWAGE SYSTEM OF THE CITY OF RANGOON. G. P. Singh.

The Public Health Engineer, No 9, p 96, May 1974.

Descriptors: *Water supply, *Sewerage, *Sewers, Municipal wastes, Waste water treatment, Water utilization, History. Identifiers: *Burma(Rangoon).

The existing sewerage system in Rangoon was installed in the year 1874 during the British regime; it covered an area of 3.4 square miles of central Rangoon, Burma. From 1915 to 1924 the system was extended, bringing the total area covered to 6.3 square miles. The remaining 44 suburbs have no sewerage at present, but are served with bucket and pit latrines. The contents of both collecting chambers flow into the main sewers which discharge into the eastern end of the Irrawaddy River. Municipal sewage is discharged into the main sewers by ejector stations at the roadside. Water consumption in the city is about 35 gallons per head per day or 70 million gallons per day. The supply is insufficient and authorities have begun Pugyi, 32 miles from Rangoon. (Sandoski-FIRL) W75-03544

STATE OF THE ART-ACTIVATED CARBON TREATMENT OF WASTEWATER, CH2M-Hill, Reston, Va. L. G. Suhr, and G. L. Culp.

Group 5D—Waste Treatment Processes

Water and Sewage Works, Vol 121, No 4, p 104-108, 110-112, April 30, 1974. 3 fig, 6 tab, 17 ref.

Descriptors: *Waste water treatment, *Activated carbon, *Tertiary treatment, Adsorption, Suspended solids, Waste treatment, *Reviews. Identifiers: Physical-chemical treatment.

Currently there are two approaches for the use of granular activated carbon in waste water treatment. One approach is to use activated carbon in a tertiary treatment sequence following conven-tional primary and biological secondary treatment. Another approach utilizes activated carbon in a physical-chemical treatment (PCT) process in which raw waste water is treated in a primary clarifier with chemicals prior to carbon adsorption. Filtration and disinfection also may be included in PCT, but biological processes are not used. The PCT approach seeks to make maximum use of granular activated carbon by extending its function of removing refractory dissolved organics to adsorption of biodegradable organics as well. In some cases, the granular bed of carbon is used as a filter to remove suspended and colloidal materials. The capabilities of PCT must be evaluated in light of specific effluent quality requirements to determine its applicability. (Sandoski-FIRL) W75-03545

A SLUDGE CAKE INCINERATION PROCESS AND AIR POLLUTION CONTROL SYSTEM, Environmental Protection Agency, Chicago, Ill. Surveillance and Analysis Div. P. Cho.

Water and Sewage Works, Vol 121, No 4, p 76-80, April 30, 1974. 2 fig, 4 tab, 4 ref.

Descriptors: *Design criteria, *Sewage treatment, *Treatment facilities, Equipment, Biochemical oxygen demand, Suspended solids, Sludge treatment, Simulation analysis, Computers, *Incineration, *Waste water treatment, *Kentucky.

Identifiers: Sludge cakes, *Air pollution control.

A study was completed in 1970 on basic design data for the proposed Secondary Treatment Facili-

A study was completed in 1970 on basic design data for the proposed Secondary Treatment Facilities for Fort Southworth Sewage Treatment Plant in Kentucky. The proposed facility was designed to provide for a minimum BOD5 removal of 90 percent and to effect comparable suspended solids removal and peak flow disinfection. The following design alternative was accepted by the City of Louisville and Jefferson County: five trains of oxygeng enerated by on-site units; twenty final settling tanks; a return sludge pumping station; chlorination facilities and chlorine contact tanks; a final effluent pumping station; and a building containing sludge thickener tanks, sludge vacuum filters, chemical handling facilities, and three multiple hearth incinerators; and, miscellaneous structures and facilities. The sludge treatment phase using the Zimpro wet air oxidation units as well as computer simulation techniques employed are described. (Sandoski-FIRL)

PVC SEWER PIPE MEETS TIGHT SPECIFICA-TIONS.

For primary bibliographic entry see Field 8A. W75-03547

SEWER PIPE: INFILTRATION IS THE ISSUE, V. Fairweather.

Civil Engineering-ASCE, Vol 44, No 7, p 79-83, July, 1974. 4 fig.

Descriptors: *Pipes, *Sewers, *Infiltration, *Inflow, *Legislation, Repairing, Federal Water Pollution Control Act, Sewage treatment, Treatment facilities.

Due to the 1972 amendment of the Water Pollution Control Act, the infiltration/inflow rates to sewers are becoming an important consideration for applicants proposing new sewage treatment facilities. A three-phase procedure for complying with regulations requires a preliminary infiltration/inflow analysis, a sewer system evaluation survey, and sewer rehabilitation and/or construction or expansion of treatment plants. The problems, economics, and technology associated with this legislative requirement are reviewed. (Sandoski-FIRL)

A BASIC STUDY OF BIOLOGICAL NITRIFICA-TION AND DENITRIFICATION, (IN JAPANESE),

T. Yamanouchi, and K. Sugata.

Mitsubishi Heavy Industries Technical Review,
Vol 11, No 3, p 87-95, May, 1974. 13 fig, 11 ref.

Descriptors: *Nitrification, *Denitrification, *Waste water treatment, Nitrogen, Nutrients, Eutrophication, *Biological treatment. Identifiers: Biological nitrification, Biological denitrification.

Advanced ways of treating waste water and sewage are increasingly in demand, because of the phenomenon of eutrophication. The total removal of nitrogen is the most significant problem facing these treatments for nutrient removal. Biological nitrification and denitrification systems are investigated as nitrogen removal methods. Results are: biological nitrification and denitrification are subject to such environmental conditions as pH value and temperature; nitrifying bacteria and denitrifying bacteria are domesticated easily, and when these systems are considered as a total biological treatment system, the utilization of existing sewage and waste water treatment systems would be the most effective method. (Leibowitz-FIRL) W75-03550

TREATMENT FOR OILY WASTE WATER USING MAGNETIC POWDER, (IN JAPANESE). Water Purification and Liquid Waste Treatment, Vol 15, No 7, p 37-44, July, 1974. 9 fig, 7 tab, 3 ref.

Descriptors: *Waste water treatment, *Oily water, *Coagulation, Water pollution control, Flocculation, Sediments. *Magnetic powder.

Chemical coagulation processes are often used to treat waste water that contains fine oil droplets. When these processes are performed by adding fine magnetic powder and suspending them in oily waste water layers, the produced flocks containing oil droplets include these magnetic powders. Coagulated flocks containing oil droplets, metal hydroxide and magnetic powder are tightened and sedimented in a magnetic field. These sediments are easily removed with the moving of the magnetic belt or rotation of the magnetic drum. (Leibowitz-FIRL) W75-03551

STUDY OF THE REMOVAL OF COPPER ION AND CADMIUM ION FROM WASTE WATER BY FLOTATION METHOD UTILIZING XANTHATE, (IN JAPANESE), Iwate Univ., Morioka (Japan). Dept. of Mining and

Iwate Univ., Morioka (Japan). Dept. of Mining a Civil Engineering. S. Hasebe, H. Sato, and Y. Sugata.

Report on Technology of Iwate University, No 26, p 41-46, November, 1973. 9 fig, 1 tab, 13 ref.

Descriptors: *Copper, *Cadmium, *Waste water treatment, *Flotation, Zinc, Water pollution, Ions. Identifiers: *Xanthate, *Calcium carbonate, Ferric ions.

A small number of cadmium and copper ions are occasionally contained together with ferric and zinc ions in waste water. The removal of copper and cadmium ions from waste water by flotation using xanthate was investigated. Copper ion was easily removed as copper xanthate by adding about 2 or 3 equivalents of methyl or ethyl xanthate; cadmium ion was removed by adding 2 or 3 equivalents of butyl or amyl xanthate. The removal of the cadmium or copper ions was influenced by the peripheral speed of the impeller; the scum was stabilized by adding frother such as methyl iso-butyl carbinol. Copper or cadmium ions in artificial waste water were reduced by the secondary treatment method, from 10 mg/liter of copper and 1 mg/liter of cadmium ions to less than 0.1 mg/liter each. The co-existence of zinc and ferrous ions prevented the removal of copper and cadmium of xanthate salt from the waste water.
Ferric ions must be turned into ferric hydroxide by adding calcium carbonate, because xanthate ion is oxidized by ferric ion when ferric ion is contained in waste water. (Leibowitz-FIRL) W75-03552

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW),

National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div. R. Field, and P. J. Szeeley. Journal Water Pollution Control Federation, Vol

Journal Water Pollution Control Federation, Vol 46, No 6, p 1209-1226, June, 1974. 228 ref.

Descriptors: *Reviews, *Overflows, *Storm runoff, *Storm water, *Urban runoff, Combined sewers, Water pollution sources, Management(Applied), Control systems, Flow characteristics, Infiltration, Storage, *Waste water treatment, *Bibliographies.

As significant contributors to water pollution, stormwater runoff and combined sewer overflows have become increasingly important to the Environmental Protection Agency as an area for concern and control. Reviewed are the characteristics of stormwater runoff and various management practices such as control systems, flow models, soil infiltration and runoff predictions. The control of combined sewer overflows, infiltration, storage, and the beneficial use of stormwater are outlined. Finally, the various treatment methods for stormwater and combined waste water are presented. (Sandoski-FIRL)

THE USE OF AEROBIC PROCESSES FOR THE STABILIZATION OF ANIMAL WASTES, North of Scotland Coll. of Agriculture, Aberdeen.

K. Robinson. Critical Reviews in Environmental Control, Vol 4, No 2, p 193-220, July 31, 1974. 4 fig, 1 tab, 130 ref.

Descriptors: *Waste water treatment, *Reviews, *Bibliographies, Agriculture, *Aerobic treatment, Agricultural runoff, *Farm wastes, Oxidation lagoons, Farm lagoons, Aerated lagoons, Oxygen, Oxygen demand, Biological oxygen demand, Microorganisms, Temperature, Hydrogen ion concentration, Hogs, Poultry.

Identifiers: *Composting, Beef, Oxygen transfer.

During the last two or three decades there has been a shift in agricultural practice from relatively small quantities and wide distribution of agricultural wastes to specialist intensive enterprises in which animal and crop production are separate and the resulting wastes are therefore more concentrated. The various aerobic methods for treating agricultural wastes such as the oxidation pond, the barrier ditch, the aerated lagoon, the aerated basin, and composting are reviewed. The advantages and disadvantages of these systems are discussed and ten areas for further research are offered. (Orr-FIRL)

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THE THREE SLUDGE SYSTEM FO NITROGEN AND PHOSPHORUS REMOVAL, Federal Water Quality Administration, Cincinnati, Ohio. Advanced Waste Treatment Research Lab. M. C. Mulbarger.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-213 778, \$4.25 in paper copy, \$2.25 in microfiche. April, 1972. 57 p, 16 fig, 29 ref.

*Waste Descriptors: water treatment. *Phosphorus, *Nitrogen, Activated sludge, Water pollution treatment, Waste treatment, Sewage treatment, Tertiary treatment, Pilot plants, Carbon, Nitrification, Denitrification, *Sludge treat-

Identifiers: Phosphorus removal, Nitrogen removal, *Three sludge system.

The three sludge (carbon removal, nitrification and denitrification) system with alum added was evaluated for the effectiveness of phosphorus and nitrogen removal. Eight months of performance data from a pilot plant were obtained. The data included measurements of pH, temperature, sub-strate concentration, COD removal, phosphorus removal, nitrification and nitrogen removal, solids production, solids characteristics, effluent suspended solids, nitrification inhibition, alkalinity losses, dissolved solids introduction, aeration and mixing requirements, chemical addition, clarifiers, solids wasting, spray water, disinfection, instrumentation, and costs. The following conclusions were made: the three sludge system is preferred over other biological nitrogen removal systems; nitrification and denitrification are temperature dependent and are pH dependent in nonacclimated cultures; phosphorus removal to a high level can be easily obtained with split alum addition and pH optimization; good removals of soluble COD and carbonaceous BOD5 are achieved with two-stage nitrification system; negative or small solids production values occur in the nitrification system and the values are temperature dependent; and alkalinity dependent addition for the pH optimization should be automated to insure maximum system dependability. (Leibowitz-FIRL)

PHOSPHORUS REMOVAL PRACTICE.

Environmental Protection Agency, Cincinnati, Ohio. Advanced Waste Treatment Research Lab. Available from the National Technical Informa-Available 110h the National Technical mitorial tion Service, Springfield, Va 22161 as PB-214 059, \$3.75 in paper copy, \$2.25 in microfiche. Presented at the Sanitary Engineering Inst., Madison, Wis., 9-10 Mar 71. (1971). 28 p, 8 fig. 13 tab, 21 ref.

Descriptors: *Phosphorus, *Sewage treatment, Activated sludge, Trickling filters, *Tertiary treat-*Waste water treatment, Sanitary engineering, Treatment facilities.

Identifiers: Phosphorus removal, Chemical treat-

A limited number of phosphorus removal processes are discussed. Only those processes which utilize chemical additions because of their economics and reliability, such as chemical treatment of raw degritted sewage, mineral addition, and tertiary treatment for phosphorus removal, are considered. The primary, secondary, and tertiary chemical addition techniques are illustrated by the use of results from specific treatment plants. Advantages and disadvantages are presented; each waste water has its own particular set of conditions and its own particular solution. (Orr-FIRL) W75-03558

COMBINATION LIMESTONE-LIME TREAT-COMBINATION LIMESTONE-LIME REAL-MENT OF ACID MINE DRAINAGE, Environmental Protection Agency, Norton, W. Va. Norton Mine Drainage Field Site. R. C. Wilmoth, R. B. Scott, and R. D. Hill.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-213 777, \$3.25 in paper copy, \$2.25 in microfiche. April, 1972. 22 p, 6 fig, 13 tab, 4 ref.

Descriptors: *Waste water treatment, *Mine drainage, *Acid mine water, *Neutralization, *Lime, *Limestones, Water clarification, Costs, Mine drainage, Mine wastes, Water pollution sources, Liquid wastes, Mine water. Identifiers: *Combination limestone-lime treat-

One of the most promising treatment methods for acid mine drainage is a combination limestone-lime neutralization. Testing at the Norton Mine drainage field in Norton, West Virginia showed that combination treatment obtained greater than 25 percent reduction in material cost for treatment of pH 6.5 as compared to lime of limestone treat-ment alone. Combination treatment also produced a sludge with solids content up to five times higher than sludge produced by lime neutralization. Combination treatment was almost as effective in clarification as lime and was more effective than limestone. The volume of sludge produced by the combination method was less than by produced by using lime or limestone. The effluent waters produced by all three methods are of comparable quality. (Orr-FIRL) W75-03559

SEWAGE TREATMENT IN THE CITY OF PLYMOUTH,

Plymouth Sewage Works (England). G. E. Tucker. Water Pollution Control, Vol 73, No 3, p 325-329, 1974, 2 fig. 5 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Sludge treatment, Sludge disposal, Equipment, Sedimentation. Identifiers: United Kingdom(Plymouth-Eng).

A discussion of the Camel's Head sewage works and the Plympton sewage works is presented. The Camel's Head process gives full treatment with heated sludge digestion with disposal by barge to the sea. When completed, the Plympton sewage works will be the largest of the city's treatment facilities, serving a population of 90,000. The sedimentation tanks of the old works were incorporated on the new works as storm tanks and space is available on the site to allow for doubling the size of the works if necessary. (Sandoski-W75-03561

METHOD OF BLEACHING WOOD PULP,

Atlantic Richfield Co., New York. R. M. Lincoln, and J. A. Meyers. Canadian Patent 949,263. Issued June 18, 1974. Canadian Patent Office Record, Vol 102, No 25, p 3, June 18, 1974.

Descriptors: *Waste water treatment, *Industrial wastes, *Pulp and paper industry, *Patents, Water pollution control, *Pulp wastes, Bleaching, pollution control, *Pulp was Methodology. Identifiers: Butyl hydroperoxide.

A method to prevent both atmospheric and water pollution in the pulp and paper industry is described. Under this process, pulping and bleaching of wood chips is accomplished in a single stage using tertiary butyl hydroperoxide in an aqueous alkaline medium. (Sandoski-FIRL) W75-03562

SEWAGE TREATMENT SYSTEM.

H. G. Long, and V. E. Long. United States 3,819,054. Issued June 25, 1974. Official Gazette of the United States Patent Office, Vol 923, No 4, p 1378, June 25, 1974. 1 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Equipment, *Patents, Septic tanks, Weirs. Identifiers: Float skimmer, Air diffuser.

A sewage treatment system especially adapted to be a conversion unit for existing septic tanks is comprised of the following equipment. An inner tank to receive raw sewage is within the septic tank and spaced from the walls with its upper surface open above the liquid line. An air diffuser system delivers compressed air within the inner tank and draws activated solid portions settline from the clarifier zone in the outer tank toward the sludge zone at the bottom and through the slot in the inner tank into the aeration zone for further aeration treatment, with a final venotched weir discharge means attached to the outer wall of the inner tank. Lastly, a float skimmer means is provided to insure the return of floating solids from the clarifier zone to the interior of the inner tank for retreatment. (Sandoski-FIRL) W75-03563

AEROBIC BIOLOGICAL STABILIZATION OF SANITARY LANDFILL LEACHATE.

Kentucky Univ., Lexington. Dept. of Civil Engineering. E. Foree, and E. Cook.

B. Force, and E. Cook. Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-214 194, \$3.25 in paper copy, \$2.25 in microfiche. Sep-tember 1972. 43 p, 3 fig, 7 tab, 13 ref.

Descriptors: *Aerobic treatment, *Biological treatment, Sewage treatment, *Activated sludge, *Leachate, Leaching, Chemical oxygen demand, Water quality, *Waste water treatment, Water quality, *\
*Landfills, Kentucky.

Treatments of raw sanitary landfill leachate by aerobic biological processes and by combinations of chemical and physical processes were evaluated. Also effluent polishing was evaluated and chemical and physical characteristics of the leachate and treated effluent were determined. Activated sludge units with a 10-day retention time were most effective in removing COD. Ninety-seven percent COD removal efficiency could be obtained by activated sludge treatment alone. In combination with effluent polishing, activated sludge treatment could obtain more than 99 percent COD removal efficiency. The physical-chemical treatment methods were not effective in treating raw leachate. (Orr-FIRL) W75-03564

OPERATING EXPERIENCE AND DESIGN CRITERIA FOR 'UNOX' WASTEWATER TREATMENT SYSTEMS, DESIGN SEMINAR FOR WASTEWATER TREATMENT FACILI-

Union Carbide Corp., Tonawanda, N.Y. Linde

Report prepared for Environmental Protection Agency, Washington, DC, Technology Transfer Program, for seminar at New York, NY, February 29-March 2, 1972, 68 p.

Descriptors: *Waste water treatment, *Activated sludge, *Oxygenation, Oxygen, Safety factors, Design, Costs, Sewage treatment, *Design criteria, Operations.

The 'UNOX' system for waste water treatment is described. This system utilizes a covered and staged oxygenation basin for contact of oxygen gas and mixed liquor. High purity oxygen is in-troduced in the first stage and flows concurrently with the waste being treated. Mass transfer and mixing within each stage is performed either by surface aerators or by a submerged turbine rotating sparge system. The number of stages and parallel biological reactors and the type of mass transfer device used depend on waste characteristics, plant size, land availability, treatment

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requirements and more. Operating data and experience, iprocess design, process safety, the 'UNOX' system scope of supply, and economic considerations are also discussed. (Orr-FIRL) W75-0356

INTERNAL POLLUTION CONTROLS IN THE

PULPING INDUSTRY, EKONO, Seattle, Washington. H. Edde, and E. Sebbas-Bergstrom.

Journal Water Pollution Control Federation, Vol 46, No 11, p 2593-2603, November 1974. 7 fig, 7

Descriptors: *Pulp wastes, *Bleaching wastes, Pulp and paper industry, *Pollution abatement, *Costs, Waste water(Pollution), Water consumption, Industrial water, *Waste water treatment, Water conservation, Water reuse, *Industrial wastes, Wastes, Biochemical oxygen demand, Chemical oxygen demand, Systems analysis, Orteonic leading, Water sullation courses, Processing, Waster, Waster, Waster, Waster, Waster, Pully Line, Parker, ganic loading, Water pollution sources, Economic justification.

Identifiers: *Kraft mills, Scandinavia, Pulp wash-

Internal process control measures for controlling pulp mill pollution and reducing materials wastage include increased pulp washing, closing the brown stock screening system, new bleaching process, improved condensate handling, and spill collection. These measures are exemplified in recent Scandinavian installations. The overall treatment costs to meet various final discharge limits in a bleached kraft mill are examined for different combinations of internal and external control measures. Compared with a conventional bleached kraft mill discharging raw BOD loads of 70-100 lb/air-dried ton of pulp, (35-50 kg/metric ton), a raw BOD load of about 30 lb/air-dried ton (15 kg/metric ton) may be reached in an 'advanced mill' using the described internal controls. The total cost to reach the same value by external treatment is about twice the cost of internal controls. (Witt-IPC) W75-03566

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE CONTREDILA POLLUTION DES EAUX EN

PAPETERIE), Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany). For primary bibliographic entry see Field 5G.

W75-03567

REMOVAL OF ARSENIC FROM EFFLUENT SLUDGES OF SULFATE AND OF PULP AND PAPER PRODUCTION (UDALENIE MYSH'YAKA IZ SHLAMOV SERNOKISLOTNOGO I TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA), V. M. Kosover.

Khimiya i Khimicheskaya Tekhnologiya, Vol 16, No 12, p 1865-1867, 1973. 3 fig, 7 ref.

Descriptors: *Arsenic compounds, *Sludge treatment, Heavy metals, *Pulp wastes, *Sulfates, *Leaching, Hydrogen ion concentration, *Industrial wastes, Water pollution sources, Toxicity, Suspended solids, Dissolved solids, Alkalis(Bases), *Waste water treatment.

Effluent sludges or slurries from the manufacture of sulfates and of pulps and papers usually contain relatively high concentrations of arsenic com-pounds, such as arsenic trioxide, trisulfide, and heavy metal arsenates. Leaching such sludges with hydrochloric acid gives incomplete As removals and, moreover, gives rise to toxic volatile arsenic trichloride. Leaching with an alkali, such as NaOH, on the other hand, converts all As com-pounds into soluble forms. Optimum operating conditions were established to include 2 hr of reaction at 80-90C at a liquor/solids ratio of 15-20:1, using 2-3% alkali. Leaching with NaOH solution has the advantage of a lower apparent energy of activation, compared to sodium carbonate solution. (Chern-IPC) W75-03568

TREATMENT OF INDUSTRIAL EFFLUENTS BY FLOTATION (TRAITEMENT D'EFFLUENTS INDUSTRIELS PAR FLOTTA-

TION), Societe Generale d'Epuration et d'Assainissement Degremont, Suresnes (France).

Revue ATIP (Association Technique de l'Industrie Papetiere), Vol 28, No 4, p 197-200, 1974. 3 fig.

Descriptors: *Pulp wastes, *Water pollution treatment, *Treatment facilities, *Waste water treatment, *Waste treatment, *Floculation, *Aeration, Suspended solids, Recirculated water, Filters, Filtration, Chlorination, Sedimentation, Chemicals, Pilot plants.

Recent advances in flotation equipment for removal of suspended solids from industrial effluents are discussed. Particular attention is focused on a process in which paper industry waste waters are aerated with compressed air and fed through a two-stage apparatus designed to form fine bubbles within floating flocks or particle aggregates while avoiding the formation of larger bubbles. Excellent flotation yield is reported at a speed five times that of a sedimentation unit while requiring less chemical consumption. Pilot-plant studies with this process in a paper mill using recirculated water resulted in the development of an effluent-treatment facility having a capacity of 250 cu m/hr which includes a coagulation-flocculation unit, a flotation unit, a battery of filters, and a pre-chlorination station. (Speckhard-IPC) W75-03569

A REVIEW OF TURBIDITY REMOVAL AS-SOCIATED WITH BIOLOGICAL TREATMENT OF PAPER MILL WASTEWATERS,

National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.

NCASI Stream Improvement Technical Bulletin, No 274, April 1974. 55 p, 26 fig, 24 tab, 40 ref.

Descriptors: *Turbidity, *Colloids, Waste treatment, *Biological treatment, *Pulp wastes, *Activated sludge, *Aerated lagoons, Oxidation lagoons, Adsorption, Flocculation, Nutrients, Temperature, Water temperature, Waste water(Pollution), *Waste water treatment, Biochemical oxygen demand, Reviews.

A survey is presented of published literature, unpublished studies, and field tests regarding the removal of turbidity-causing colloid particles in paper mill effluents by means of aerobic biological treatments. Both the activated sludge and the aerated stabilization basin process remove turbidity through a mechanism involving bio-adsorption and flocculation. The efficiency of colloid removal is improved by (a) temperatures above 15-18 C, (b) nutrient additions sufficient to support maximum BOD removal, and (c) high-rate systems, such as activated sludge treatment. (Buchanan-IPC) W75-03574

CONTROL COMPOSITIONS AND SLIME THEIR USE,

Betz Labs., Inc., Trevose, Pa. (assignee)
B. F. Shema, R. H. Brink, Jr., and P. Swered.
US Patent No 3,829,424. Issued Aug 13, 1974. 4 p,

Descriptors: *Slime, *Pesticides, *Waste water treatment, *Industrial water, *Water conservation, *Recirculated water, *Pulp and paper indus-

try, Organic compounds, Bromine, Freshwater, Closed circuits, Additives, Chemicals. Identifiers: White Slimicides, machine).

A slimicidal mixture of bromonitrostyrene and cetyl pyridinium bromide can be added to the white water system of paper machines, notably those conserving freshwater by full or partial closure of the water circuit, to prevent or control the formation of bio-organic deposits. (Lynch-IPC) W75-03575

PEAT: NEW MEDIUM FOR TREATING DYE HOUSE EFFLUENT, Hussong-Walker-Davis Co. Cornwells Heights,

American Dyestuff Reporter, Vol 63, No 8, p 15-16, 18, August 1974. 6 fig, 2 tab.

Descriptors: *Dyes, *Heavy metals, *Waste water treatment, Waste treatment, *Chemical wastes, *Textiles, *Peat, Pollution abatement, Effluents, Industrial wastes, Color, Turbidity, Chemical oxygen demand, Biochemical oxygen demand, Phosphates, Suspended solids, Cadmium, Chromium, Copper, Iron, Lead, Nickel, Zinc, Mercury, Metals, Operating costs, Filtration, Filters, Solids contact processes. Identifiers: *Antimony.

A recently developed process for removing pollutants from textile dye house effluents is based on the scrubbing action of a moving mat of peat as the effluent is passed through it. In tests performed on actual dye house effluents with an operational water treatment system (not in a laboratory but under carefully controlled conditions), color was reduced by as much as 99.6%, turbidity by 100%, COD by 98.7%, BOD by 95%, total oxygen demand by 87.8%, phosphates by 97.7%, and suspended solids by 98.1%. The removal of heavy metal pollutants (Cd, Cr, Cu, Fe, Pb, Ni, Zn, Sb, and Hg) was virtually complete. The spent peat, which is the only by-product of the process, can be disposed of in a sanitary landfill or may be dried and burned. Operating costs, when treating textile dye effluent, range from 7 to 14 cents/1000 gal. (Witt-IPC)

LIGHT-ENERGIZED OXIDATION OF OR-GANIC WASTES, Montana State Univ., Bozeman, Dept. of Civil En-

gineering and Engineering Mechanics.

J. W. Sargent, and R. L. Sanks.

Journal Water Pollution Control Federation, Vol

46, No 11, p 2547-2554, November 1974. 9 fig, 15

Descriptors: Waste treatment, *Chemical degrada-tion, Waste water(Pollution), Pollutants, *Organic tion, Waste water(Poliution), Poliutants, "Organic wastes, "Waste water treatment, "Radiation, Light, Dyes, Organic compounds, "Industrial wastes, Energy, Anaerobic conditions, Aerobic conditions, Kinetics, Laboratory tests, Phenols, Chemical reactions, Oxidation, Aqueous solutions Chemical wastes Chemical reactions, Ctions, Chemical wastes.

tions, Chemical wastes.
Identifiers: *Photooxidation, Methylene blue,
Photodegradation, Photochemistry, Reaction
mechanisms, Reaction kinetics, *Cresol.

Laboratory studies indicate that a refractory organic substance (cresol) in aqueous solution can be destroyed by photooxidation, a process that uses visible light as a direct energy source. Methylene blue is an effective photosensitizer for cresol. Optimum initial concentrations for the dye and the cresol were determined. The reaction rate at which the photooxidation process proceeds can be roughly described by first-order kinetics, although the reaction mechanism is probably not simple first-order. The reaction proceeds 2.8 times faster in an aerobic than in an anaerobic environment. The significant amount of cresol photooxidation

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achieved indicates that photooxidation has potential as a waste treatment process and further study and development. (Witt-IPC)

MODIFIED CELLULOSE ADSORBENT FOR REMOVAL OF MERCURY FROM AQUEOUS

Bureau of Mines, Salt Lake City, Utah. Salt Lake City Metallurgy Research Center.

W. N. Marchant. Environmental Science and Technology, Vol 8, No 12, p 993-996, November 1974. 3 fig, 2 tab, 4

Descriptors: Waste treatment, *Mercury, *Water purification, *Cellulose, *Separation techniques, *Waste water treatment, Adsorption, Water pollution, Metals, Pollutants, Water pollution control, Heavy metals, Sulfur compounds, Inorganic compounds, Organic compounds, Organic compounds, Identifiers: Cellulose derivatives, Adsorbents.

Inorganic mercury was selectively removed from aqueous solution over a pH range of 1-9 by a modified cellulose adsorbent containing vicinal thiol groups. The amounts of mercury removed from solution were dependent on the flow rate. When a solution containing 1 ppm mercuric ion was passed through a column (10 mm inside diameter by 23 mm) prepared from 0.5 g of the cellulose derivative at an initial flow rate of 50 ml/hr, the mercury concentration in the effluent remained below 5 ppb for 60 bed volumes. (Witt-IPC) W75-03579

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KAR-TONINDUSTRIE), Cellulose Attisholz A.G., Solothurn (Switzerland).

A. Scherler. Wochenblatt fuer Papierfabrikation, Vol 102, No 9, p 315-324, May 15, 1974. 7 fig.

Descriptors: Water types, *Sludge treatment, "Sludge disposal, "Dewatering, Treatment facilities, Equipment, "Pulp wastes, "Waste water treatment, Filters, "Filtration, Centrifugation, Europe, Pulp and paper industry, Economics, *Waste disposal, Cost-benefit analysis, Costs, Operating cost, Industrial wastes. Identifiers: *Switzerland.

Described are the amounts of sludge produced in various kinds of paper industry effluent treatment various littles to paper insularly etinent treatment plants; different types of water in sludges (interstitial, capillary, adsorptive, etc.); sludge thickening and dewatering methods and equipment; sludge pretreatment (preconditioning by chemical and/or thermal methods); and engineering calculations and cost-benefits analyses for sludge treatment and disposal. The relative effi-ciencies of various dewatering machines are illustrated, notably vacuum and pressure filters, such as the vertical tower filter press, the horizontal Andritz dewatering press, and the conical-cylindrical screw decanter (centrifuge). How economically these machines are being used at two Swiss paper mills (Biberist and Utzenstorf) is illustrated by detailed cost figures. (Speckhard-IPC) W75-03580

METAL SALTS OF DITHIOCARBAMIC ACID DERIVATIVES, THEIR MANUFACTURE AND USE (METALLSALZE VON DITHIOCAR-BAMIDSAEURE-DERIVATEN, DEREN HERSTELLUNG UND VERSENDUNG), Buckman Labs., Inc., Memphis, Tenn. J. D. Buckman, and J. D. Pera.

German Patent (Offenlegungsschrift) No 2,308,807. Nov 8, 1973. 30 p, 8 tab.

Descriptors: *Pulp wastes, *Slime, *Waste water treatment, *Water conservation, *Pesticides, Chemicals, Closed conduits, Pulp and paper industry, Industrial water, *Recirculated water, Sulfur compounds, Nitrogen compounds, Potassium compounds, Organic compounds, *Thiocarbamate pesticides, Carbamate pesticides.
Identifiers: Slimicides, White water(Paper

Slime deposits in pulp and paper mill water systems, notably in closed circuits for conservation of freshwater, are controlled by introducing sium N-hydroxymethyl-N-methyl-dithiocarba-mate. (Speckhard-IPC)
W75-03581

PROCESS FOR WASTE WATER PURIFICA-TION (VERFAHREN ZUM REINIGEN VON AB-

WASSER), Casco A.B., Stockholm (Sweden). E. S. Hecktor, H. Storstrom, and G. W. L. Eselbock.

Patent (Offenlegungsschrift) No German 2,308,815. Sept 6, 1973. 9 p, 2 tab.

Descriptors: *Chemical precipitation, Waste treatment, *Pulp wastes, *Suspended solids, *Flocculation, Sedimentation, *Flotation, Polymers, Additives, *Coagulation, *Waste water retreatment, Hydrogen ion concentration, Mixing, Chemicals, Phenois, Polymers, Polyelectrolytes, Lignins, Carbohydrates, Fibers(Plant), Water pu-Identifiers:

Phenol-formaldehyde resins, oxide, Polyethers, Aluminum Polyethylene

A process is provided for removing suspended solids from industrial waste waters, notably ef-fluents of the paper, paperboard, and fiberboard industries which contain cellulosic fibers, fines, fillers, and dissolved lignin degradation products and hemicelluloses. The process involves the addition and dissolution of a phenol-formaldehyde resin in the waste water at an alkaline pH, followed by pH reduction through addition of aluminum sulfate or the like, until the resin precipitates while coprecipitating suspended solids. The precipitate is then separated by sedi-mentation or flotation. The agglomeration of phenolic resin flocs can be improved by mixing an aqueous solution of polyethylene oxide or other high-molecular-weight polyether with the resin. (Speckhard-IPC) W75-03582

EFFECT OF BOD(5) LOADS AND CAR-BOHYDRATE CONCENTRATION ON WASTE WATERS ON THE DEVELOPMENT OF FILA-WATERS ON THE BEVELOFMENT OF THE MEMORY OF T

T. V. Zharova, and L. M. Abramova. Gidroliznaya i Lesokhimicheskaya Promyshlen-nost', No 5, p 17-18, 1974. 2 tab, 5 ref.

Descriptors: *Organic loading, *Carbohydrates, Hydrolysis, *Fermentation, Industrial wastes, Waste water(Pollution), *Wood wastes, Waste reatment, *Waste water treatment, Activated sludge, *Biological treatment, *Bacteria, Aerated lagoons, Settling basins, Sedimentation rates, Sludge, *Biochemical oxygen demand, Treatment facilities, Foreign countries, Aquatic bacteria, Aeration, Nutrients.

Identifiers: Bacillus subcuticularis, Hydrolysis in-

Aqueous effluents of wood hydrolysis factories contain large amounts of organic materials, mostly unfermented carbohydrates, humins, furfural, and organic acids. During purification of these ef-fluents, surges of filamentary bacterial growth are frequently observed which interfere with biological treatment, since they contribute to the swelling and poor sedimentation of activated sludge in secondary settling tanks. Filamentary growths are more common in media of lower organic loading. A systematic study of this phenomenon was conducted with a pure culture of Bacillus subcuticularis isolated from an aeration tank and grown in media containing 455 to 3300 mg/liter of 5-day BOD, viz., residual yeast-fermentation liquors supplemented with N and P compounds, with or without added glucose. In high-BOD media (2800-3300 mg/liter), only small cocci but no filamentary bacteria were observed, whereas filamentous growths occurred within 4 days in lower-BOD media (1400-1650 mg/liter) treated with glucose. At still lower BOD (650-850 mg/liter), filamentary bacteria developed even in the absence of glucose, although their growth was accelerated by glucose. To avoid such growths in aeration tanks, it is recommended to operate effluent treatment facilities at high BOD loadings and to reduce sugar concentrations in waste waters by more thorough prior fermentation. (Stapinski-IPC) W75-03583

THE 'SHOCK ABSORBER' SYSTEM OF WASTEWATER TREATMENT, J. W. Day.

Paper Processing, Vol 10, No 9, p 27-31, Sept 1974. 6 fig, 6 tab.

Descriptors: *Oxygenation, *Oxygen, *Activated sludge, Waste treatment, *Pulp wastes, *Aeration, *Waste water treatment, Economics, Biochemical oxygen demand, Biological treatment, Odor, Energy, Surges.

Identifiers: Unox(Oxygen-aided activated sludge)

Union Carbide Corp. pilot-plant studies led to the commercial development of the 'Unox' process, in which high-purity oxygen is used to aid activated sludge treatment of waste waters. Trial runs with effluents from bleached and unbleached kraft, sulfite, and groundwood/kraft combined pulp mills evidences BOD removals of 87% to 95%. Advantages claimed for the Unox process over plain air systems include reduced land area requirement, less off-gas odors, improved process control, better response to surges, and less power demand. (Hansen-IPC) W75-03584

MILL EFFLUENT AND ITS UTILISATION FOR

CROP CULTIVATION PURPOSES, S. J. Khambatta, and C. M. Ketkar. Paper (London), Vol 182, No 2, p 88, 90-91, July 17, 1974. 3 tab, 3 ref.

Descriptors: Treatment facilities, "Activated sludge, "Biological treatment, "Pulp wastes, Waste treatment, "Waste water treatment, Irrigation, "Soil disposal fields, Landfills, Incineration, Agriculture, Crops, Crop response, "Effluents, Discharge(Water), Filtration, Soil bacteria, Percolation, Path of pollutants, Lignins, Carbohydrates, Nutrients, Plant growth, Dissolved solids, Suspended solids, Color, Sludge disposal. disposal. Identifiers: India, Straw, Straw(Paper) mills.

An Indian mill producing mechanochemical pulp and fine papers, such as greaseproof and glassine, from rice straw, has installed a modern activated sludge effluent treatment facility. The treated effluent is suitable, according to regulations of the Indian Standards Institution, for irrigation of crop lands, while the dried sludge is used as landfill and/or domestic fuel. Effluent characteristics and the treatment installation are described. Largescale irrigation experiments indicated that the lignins, polysaccharides, and residual nutrients

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present in the treated effluent are not detrimental to the growth of paddy rice, sugar cane, groundnuts, vegetables, and other crops. On the contrary, increased plant yields indicate a beneficial effect. Color, dissolved solids, and suspended solids are appreciably reduced by soil percolation, filtration, and action of anaerobic soil bacteria. (Buchanan-W75-03585

MEASUREMENTS OF SLUDGE LEVEL AND SLUDGE DENSITY IN CLARIFIER INSTALLA-TIONS (MESSUNGEN VON SCHLAM-MINIVEAU UND SCHLAMMDICHTE IN KLAERANLAGEN), Der Papiermacher, Vol 23, No 5, p 76-77, May 11,

1974. 2 fig.

Descriptors: *Instrumentation. *Sludge. *Treatment facilities, *Waste treatment, *Waste water treatment, Sedimentation, Flocculation, Storage tanks, Density, Measurement.

Two photoelectric instruments developed by the Siemens Co. in Germany are described and illustrated. One is designed to measure the sludge level, the other the sludge content (bulk or density) in waste water treatment basins. (Speckhard-IPC) W75-03586

UNIQUE NEW SECONDARY OXYGEN TREAT-MENT SYSTEM FOR EFFLUENT, Paper Trade Journal, Vol 158, No 31, p 22-23, Aug

5, 1974, 2 fig.

Descriptors: *Oxygenation, *Oxygen, *Treatment facilities, Waste treatment, *Waste water treatment, *Activated sludge, Equipment, Industrial wastes, Municipal wastes, Energy, Explosions, Safety, Oxidation, Mixing, *Pulp wastes, Safety, Oxidation, Mixing, Pipelines.

Identifiers: Black liquors, Kraft mills, F30(Free-Fall Oxygenation) process.

'F30' (free-fall oxygenation) developed by Airco Cryoplants Division of Airco Industrial Gases is based on an enclosed waterfall reactor for treating domestic and industrial waste waters with pure oxygen in activated sludge systems. The self-contained modular units require no tank covers, are easily installed in existing treatment facilities, and minimize explosion or combustion hazards. Their power consumption is low, and oxygen-utilization efficiencies of 90% or higher are reported. A special pipeline reactor suitable for oxidation of kraft mill black liquors has also been devised. (Hansen-IPC) W75-03587

PULPING PROCESS PREVENTS POLLUTION,

R. A. Young. Pollution Engineering, Vol 5, No 4, p 33-34, April 1973, 2 fig.

Descriptors: *Pollution abatement, *Washington, Descriptors: "Pollution abatement, "Washington, Columbia River, "Pulp wastes, Pulp and paper industry, Treatment facilities, "Sulfite liquors, Water quality, Waste treatment, "Waste water treatment, Calcium, Magnesium, Costs, Costbenefit analysis, Employment, Economics, Biochemical oxygen demand.

Identifiers: Magnefite pulping process, *Chemical recovery.

When Washington State modified its water quality standards to require a 70% reduction in discharged effluent BOD, several sulfite pulp and paper mills along the Columbia River were faced with the decision of closing down, curtailing production, or altering their manufacturing technology to meet attenting their institute of the stricter regulations. Two mills did shut down. At Camas, Washington, a 420 ton-per-day pulp mill of Crown Zellerbach Corp. was converted from the traditional calcium-base to a new magnesium-base sulfite cooking process. This

'Magnefite' process is described, including the Magnetite process is described, including time method of recovering chemicals (sulfur and magnesium hydroxide) from the spent liquor. The Magnefite process meets both water and air quality codes, but has increased the mill's production costs, mainly by requiring 13 more employees. (Witt-IPC) W75-03588

METHOD OF REDUCING THE DISCHARGE OF WASTE PRODUCTS FROM PULP MILLS, Skogsagarnas Industri A.B., Vaxjo (Sweden).

(assignee) N. V. Mannbro

U. S. Patent No 3,830,688. Issued Aug 20, 1974. 8 p, 1 fig.

Descriptors: *Pulp wastes, *Water conservation, *Bleaching wastes, *Industrial water, *Industrial wastes, *Waste water treatment, Lignins, Oxidation, Evaporation, Pulp and paper industry. Identifers: Kraft mills, Black liquors, Chemical recovery.

A method for reducing the freshwater consumption as well as the waste water discharge volume of pulp mills is described. It makes use of a nonoxidative pulping (chemical cooking) and an oxidative bleaching process. The cooked chips containing spent pulping liquor are passed from the digester to a brown stock washer where the liquor is washed out of the pulp with an aqueous solution containing volatile digestion residues from the spent liquor evaporation condensate. The undiluted pulp then passes directly to a high-density oxidative bleaching tower for further delignifica-tion and simultaneous oxidation of residual spent liquor chemicals, followed by an alkaline extrac-tion stage. Liquor discharged from the brown stock washer can be combined with the alkaline extraction effluent and conveyed to a chemical recovery system. (Lynch-IPC) W75-03590

REMOVAL OF TRACE METALS FROM WASTE WATER BY TREATMENT WITH LIME AND DISCARDED AUTOMOTIVE TIRES,

Canada Centre for Inland Waters, Burlington

A. Netzer, P. Wilkinson, and S. Beszedits. Water Research, Vol 8, No 10, p 813-817, Oct 1974. 3 fig, 1 tab, 5 ref.

Descriptors: *Heavy metals, Water purification, *Lime, Waste treatment, *Waste water treatment, *Rubber, *Trace elements, *Adsorption, Liquid wastes, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Laboratory tests, Hydrogen ion concentration, Cations, Industrial wastes, Chemical

Identifiers: *Silver.

Laboratory experiments evaluated the feasibility of using discarded automotive tires in conjunction with lime to remove Al, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Ag, and Zn from aqueous solutions. The results showed that the groundup rubber is particularly useful as a polisher for removing final traces of metal after conventional lime treatment. It is as effective as activated carbon, cheaper, and easier to dispose of. Furthermore, the rubber reduces the amount of lime required which, in turn, leaves less sludge for dewatering and disposal. Better than 99% metal removal or less than 0.1 ppm residual metal concentration was achieved for Cd, Co, Mn, and Ni (pH 10-11), Al (pH 5-8), Cr (pH 5-11), Cu (pH 5.5-11), Fe (pH 3-11), Pb (pH 8-11), Hg (pH 4.5-11), Ag (pH 6-11), and Zn (pH 9-11). (Witt-IPC) W75-03591

SYSTEM FOR RECOVERY OF FIBER FROM PAPER MILL EFFLUENT, INCLUDING A SIEVE BEND SCREEN.

Dorr-Oliver, Inc., Stamford, Conn. (assignee)

A. Boniface. U.S. Patent No 3,833,468. Issued Sept 3, 1974. 14 p, 11 fig.

Descriptors: *Pulp wastes, *Industrial wastes, Waste treatment, *Waste water treatment, *Recycling, *Recirculated water, Suspended solids, *Fibers(Plant), Screens, Filters, Filtration, Waste water(Pollution), Equipment, Effluents, Pollution abatement.

Identifiers: White water(Paper machine effluent).

The various waste waters of a paper mill are collected in the form of a suspension which is passed under pressure through a sieve-bend screen. The function of the screen is to separate an overflow fraction containing long reuseable fibers from the underflow fraction which carries off other entrained solids. (Lynch-IPC) W75-03592

BENEFICIATION OF LIGNIN SOLUTIONS AND PULP MILL WASTES,

Betz Labs., Inc., Trevose, Pa. (assignee) K. R. Lange, A. M. Stern, L. L. Gasner, and Y. T.

U. S. Patent No 3,829,388. Issued Aug 13, 1974. 5 p. 5 tab.

Descriptors: *Pulp wastes, *Industrial water, *Cooling water, *Boiler feed water, *Water treatment, *Lignins, *Corrosion control, *Scaling, Water softening. Identifiers: Alkali lignins, Black liquors, Kraft lig-

nin, Scale inhibitors

A method for reducing scale and deposit formation in boiler feedwater, cooling water, and other aque-ous industrial systems involves the addition of a sequestering agent derived from a soluble lignin derivative, such as alkali lignin obtained from kraft pulp black liquor. (Lynch-IPC) W75-03593

SLIME CONTROL IN INDUSTRIAL WATERS,

Economics Lab., Inc., St. Paul, Minn. (assignee) H. J. Hatcher, R. J. Truda, T. G. Lechner, and C. R. McDuff.

U. S. Patent No 3,824, 184. IssuedJuly 16, 1974. 5 p, 5 tab.

Descriptors: *Waste water treatment, *Industrial water, Closed circuits, *Slime, *Pesticides, *Enzymes, Pulp and paper industry, Chemicals, Additives, Recirculated water, *Pulp wastes. Identifiers: Levan hydrolase, White water(Paper machine)

Pulp and paper mill water systems, notably closed circuits, can be protected against formation of slime deposits by adding suitable amounts of an enzyme preparation based on levan hydrolase. (Lynch-IPC) W75-03594

METHOD OF DECOLORIZING WASTE PROCESS LIQUID DISCHARGED BY A PAPER MILL, Owens-Illinois, Inc., Toledo, Ohio. (assignee)

H. C. Croom. U. S. Patent No 3,833,463. Issued Sept 3, 1974. 8 p, 2 fig.

Descriptors: *Pulp wastes, *Lime, Waste treatment, *Waste water treatment, *Color, *Chemical precipitation, Calcium carbonate, Carbon dioxide, Hydrogen ion concentration, *Pulp wastes.

Aqueous effluents of pulp and paper mills are decolored by a chemical process comprising the following steps: (1) carbonation to neutralize the pH, (2) addition of lime mud to form soluble calcium bicarbonate in the presence of carbon dioxide, (3) repeated carbonation. (4) addition of lime to raise the pH and precipitate calcium carbonate, (5)

treatment with carbon dioxide to reduce the pH treatment with carbon dioxide to reduce the pH and to form a carbonate with any remaining soluble calcium, and (6) removal of the precipitated calcium carbonate together with coprecipitated color bodies. (Lynch-IPC) W75-03595

METHOD OF DECOLORIZING PAPER MILL

EFFLUENT LIQUID, Owens-Illinois, Inc., Toledo, Ohio. (assignee) O. E. Rolfe.

U. S. Patent No 3,833,464. Issued Sept 3, 1974. 8 p, 3 fig.

Descriptors: *Pulp wastes, *Chemical precipita-tion, *Color, Waste treatment, *Waste water treat-ment, *Lime, Calcium carbonate, Carbon dioxide, Pressure, Effluents, Adsorption.

A method for reducing the color of aqueous pulp and paper mill effluents, such as kraft mill wastes, involves the following chemical treatment steps:
(1) Addition of excess calcium carbonate, (2) pressure application in the presence of carbon dioxide to convert the carbonate to soluble calcium bicarbonate, and (3) discharging the pressurized liquid to atmospheric pressure, thereby precipitating insoluble calcium carbonate which carries adsorbed color bodies with it. (Lynch-IPC)

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY, Rust Engineering Co., Birmingham, Ala.

A. B. Adams, Jr.

Journal of the American Oil Chemists' Society, Vol 50, No 12, p 498-500, Dec 1973. 3 fig, 4 ref.

Descriptors: Waste treatment, Water pollution treatment, *Pulp wastes, *Air pollution, *Waste water treatment, *Pollution abatement, *Odor, Engineering, Structural engineering, Equipment, Treatment facilities, Incineration, Biochemical ox-

reatment facilities, incineration, Biochemical ox-ygen demand, Color, Storage tanks, Valves, Skimming, Byproducts, Sumps. Identifiers: "Tall oil, Sulfate soap, Kraft mills, Black liquors, Flue gases(Stack gases), Lime kilns, Recovery furnaces, Hoods.

In the production of tall oil from the sulfate soap skimmed from black liquor, the control of air pol-lution requires preventive measures in the design of new mills, or corrective measures to be taken by older existing kraft pulp mills. For controlling air pollution, these measures involve essentially the enclosure of all black liquor vessels from which tall oil is to be recovered, e.g., by installa-tion of hoods on storage tanks, sumps, heat exchangers, etc., along with ventilation ducts and flue gas scrubbers or incinerators. Odorous gases are typically burned in kraft recovery furnaces and/or lime kilns. Water pollution is prevented best by careful design of soap skimmers, level controls, and valve systems. Some tall oil will still enter the waste water stream and requires an ef-fluent treatment installation designed to remove this additional BOD load, along with the color of the treated effluent. (Witt-IPC) W75-03598

REMOVAL OF RESIN ACIDS FROM CULTURE MEDIA AND KRAFT-MILL EFFLUENTS BY YEASTS AND SOME OTHER FUNGI, National Research Council of Canada, Saskatoon (Saskatchewan). Prairie Regional Lab.

J. F. T. Spencer, G. D. Sinclair, and N. R. Gardner. Canadian Journal of Microbiology, Vol 20, No 9, p 1288-1290, Sept 1974. 1 fig, 2 tab, 5 ref.

Descriptors: *Microorganisms, *Yeasts, *Fungi, Aquatic microorganisms, *Waste water treatment, Organic acids, *Resins, *Pulp wastes, *Biological treatment, Waste treatment, Toxicity, Nutrients. Epicoccum nigrum, Rhinocladiella mansonii, Rhodotorula minuta, and Trichosporon cutaneum were evaluated for their ability to remove resin acids from nutrient-supplemented kraft mill effluents and from a nutrient medium containing yeast extract as the sole source of nitrogen. Up to 39% of the resin acid content was removed by all four organisms. As measured by the induction of gene conversion in a strain of Saccharomyces cerevisiae, the mutagenic activity of the resin aci preparation was low, if at all existent. (Witt-IPC) W75-03599

ULTRAFILTRATION OFFERS 'GOOD'

REMOVAL OF COLOR, COD, BOD. Canadian Pulp and Paper Industry, Vol 27, No 9, p 50-52, Sept 1974. 4 fig, 1 tab.

Descriptors: Treatment facilities, *Pulp wastes,
Waste treatment, *Waste water treatment,

*Pulp varies Membrane Filtration, Reverse osmosis, Membrane processes, Effluents, Separation techniques, *Biochemical oxygen demand, *Color, *Chemical oxygen demand, Pressure, Temperature, Mixing, Costs, Operating cost, Capital cost.
Identifiers: *Ultrafiltration, Agitation, Cellulose acetate, Molecular weight, Kraft mills.

A filtered sample of bleached kraft mill effluent was treated with defoamer and subjected to ultrafiltration at a specific pressure and with constant agitation. The ultrafiltration provided good removals of color, COD, and 5-day BOD. The process was not dependent on pressure, thus process was not dependent on pressure, thus operating at lower pressures than reverse osmosis. However, rate of agitation was an important variable. BOD removal was best for a cellulose acetate membrane of 10,000 molecular weight or less. Process economics for a 500 t/day ultrafiltration. installation are estimated at \$20 to \$50 million for capital investment and \$1 per 1000 gal in operating costs. (Sykes-IPC) W75-03600

NOVEL METHODS OF FRESHWATER PREPARATION AND WASTE WATER PURIFICATION IN PULP AND PAPER MILLS (NEUERE METHODEN ZUR FRISCHWASSERAUFBEREITUNG UND ABWASSER-REINIGUNG IN ZELLSTOFF- UND PAPIER-REINIGUNG IN ZELLSTOFF- UND ZELLSTOFF- UND PAPIER-REINIGUNG IN ZELLSTOFF- UND PAPIER-REINIGUNG IN ZELLSTOFF- UND PAPIER-REINIGUNG IN ZELLSTOFF-

C. Auer-Welsbach.

Wochenblatt fuer Papierfabrikation, Vol 102, No 8, p 293-294, 296, April 30, 1974.

Descriptors: *Water purification, Freshwater, Water treatment, *Waste water treatment, Waste treatment, *Pulp and paper industry, *Reverse osmosis, *Flotation, Membrane processes,
*Floculation, *Oxidation, Adsorption,
*Activated carbon, Electrochemistry, Chemicals,
Industrial water, Pollution abatement.

Identifiers: Thermal oxidation, Electrochemical flocculation.

Water and waste water treatment processes based on electroflotation, electrochemical flocculation, thermal oxidation, activated carbon adsorption, and reverse osmosis are reviewed. Process parameters and efficiencies are indicated, and advantages versus limitations of each method are compared. (Speckhard-IPC) W75-03602

HYBRID DONNACONA TMR PLANT FEATURES ZERO POLLUTION,

L. Skory. Canadian Pulp and Paper Industry, Vol 27, No 8, p 20-22, Aug. 1974. 5 illus.

Descriptors: *Industrial water, *Recirculated water, *Filtration, *Pulp wastes, *Filters, *Water conservation, Pulp and paper industry, *Canada, Effluents, Discharge(Water), *Waste water treat-

Identifiers: *Thermomechanical pulp refining, Newsprint, White water(Paper machine effluent).

At Donnacona, Quebec, Domtar Pulp and Paper Ltd. has built a \$4.6 million thermomechanical pulp refining (TMR) pilot plant utilizing six disk refiners for defibration of steam-pretreated wood refiners for defibration of steam-pretreated wood chips to be made into newsprint. The refiner installation is connected with the paper machine's white water system in such a way that water is being recycled and only 100 gal/million with a 20 ppm solids content needs to be sewered. A Vargo filter (made by Polcon Engineering Co.) makes it possible to reclaim all the water needed for dilution of the paper, stock in the pulper, and for paper. the paper stock in the pulper and for paper-machine shower sprays. (Sykes-IPC) W75-03603

BIOCHEMICAL PURIFICATION OF WASTE WATERS AT THE SYAVSK (WOOD-PYROLY-SIS) COMBINE (BIOKHIMICHESKAYA OCHISTKA STOCHNYKH VOD NA SYAV-SKOM KOMBINATE), Svavskii Lesokhimicheskii Kombinat (USSR).

Syavskii Lesokimicheskii Komoinat (USSR).

N. K. Molodtsov, M. F. Morozov, P. S. Fokin, E.

V. Mikhalitsyna, and L. N. Smirnova.

Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 5, p 22-24, 1974. 1 fig., 1 tab.

Descriptors: *Industrial wastes, Waste treatment, *Waste water treatment, Treatment facilities, *Wood wastes, *Chemical wastes, *Activated sludge, *Biological treatment, Biochemical oxygen demand, Chemical oxygen demand, Water ollution sources, Foreign countries, Sewage

Identifiers: USSR, Wood pyrolysis, Joint (Municipal/industrial waste) treatment, Acetic acid, Ethyl acetate, Methyl alcohol(Methanol),

At the wood-processing and silvichemical factory At the wood-processing and suvicemental factory of Syavsk (USSR), mechanical and chemical effluent purification facilities have been operating since 1969. An activated sludge system for biochemical treatment has been added in 1973. Highly polluted effluents originating mainly from wood pyrolysis, manufacture of acetic acid and wood pyrotysis, manufacture of acetic acid and ethyl acetate, and processing of wood tar and wood alcohol (methanol) are purified jointly with municipal sewage. The treatment installation, which is described in some detail, reduces the effluent COD from 720-1400 to 128-192 mg/liter, i.e., by 82%, and the 5-day BOD from 540-1080 to 6-36 mg/liter, i.e., by 97%. (Stapinski-IPC) W75-03606

DECOLORIZING DYE WASTES, Rohm and Haas Co., Philadelphia, Pa. Pollution Control Research Dept. D. C. Kennedy, B. Stevens, and J. W. Kerner. American Dyestuff Reporter, Vol 63, No 8, p 11-14, August, 1974. 7 fig, 3 tab.

Descriptors: *Dyes, *Waste water treatment, *Waste treatment, *Chemical wastes, Industrial wastes, Effluents, Anion exchange, Adsorption, wastes, Ettuents, Anion exchange, Adsorption, Solids contact processes, Pollution abatement, Polymers, Water pollution control, Color, Chemical oxygen demand, Copper, Chromium, Heavy metals, Ion exchange, Solvents, Incineration, Chelation.

Identifiers: *Amberlite resins.

A system employing polymeric adsorption to decolorize streams containing waste dyestuffs has been in operation for about a year at the plant of a major dye producer in the Northeast United States. The system reduces the color of the waste stream (300,000 gal/day) from an average of 75,000 to 500 APHA units on the Pt-Co scale, and the COD from an average of 5,280 to 2,600 ppm. The system also removes copper and chromium both as salts and as organic chelates. The operating system consists of two columns of polymeric ad-sorbent (Amberlite XAD-7) each followed by an

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anion exchange polisher. When exhausted the adsorbent and anion exchange resin are regenerated with a solvent. The solvent is condensed for reuse, and the concentrated aqueous solution of waste dvestuffs is further concentrated and disposed of by incineration. (Witt-IPC) W75-03608

PROBLEM-FREE CLARIFIER SLUDGE TREATMENT BY A NEW THERMAL TWO-PROBLEM-FREE SLUDGE STAGE PROCESS (PROBLEMLOSE KLAERSCHLAMMBEHANDLUNG DURCH EIN NEUES THERMISCHES ZWEISTUFEN-VER-FAHREN). W. Vogeno.

Das Papier, Vol 28, No 5, p 209-210, May 1974. 2

Descriptors: *Sludge treatment, *Sludge disposal, Ultimate disposal, *Dewatering, *Incineration, Equipment, Treatment facilities, Europe, *Waste water treatment, Pulp wastes, Pumping, Drying, Solid wastes.
Identifiers: *Thermal treatment, Heat recovery,

Flue gases, Germany.

Thermal dewatering followed by incineration is the basis of a newly developed two-stage process for drying and disposal of effluent-treatment sludges, which is said to be applicable to sludges of any consistency. The schematically illustrated ment is produced by KHD Industrieanlagen AG Humboldt Wedag in Cologne, West Germany. It comes in two varieties, one designed for pumpable sludges, the other for thicker slurries, and includes provisions for heat recovery and exhaust gas purification. (Speckhard-IPC) W75-03609

REMOVING THREE AIR POLLUTANTS AT

Environmental Science and Technology, Vol 8, No 9, p 788-789, September, 1974. 1 fig, 1 tab.

*Aluminum, *Air pollution, Descriptors: *Industrial wastes, *Waste treatment, Particle size, Effluents, Recycling, Wastewater.

The removal of aluminum hydroxide, aluminum chloride, hydrogen chloride and particulate matter from the exhaust of an aluminum processing plant by the use of venturi scrubbers was discussed. These scrubbers are unique in that the venturi diverging section is located within the main scrubber chamber and passes vertically through the packed entrainment separator. In operation, gas effluent from the aluminum bonding oven enters the top of the scrubber at the rate of approximately 35,000 acfm while water is injected at 200 gpm. Both water and gas speed through the highly constricted venturi throat and are thoroughly mixed as the water passes over a small turbulence producing 'knee' projection around the periphery of the venturi throat. Cleansed air is pulled through two 32-in. diameter exhaust pipes (at 16,000 acfm each) at the top of the scrubber, then to the base of a 40-ft. high exhaust stack. Exhausted air is approximately 99% free of pollutants and produces a barely visible steam plume that dissipates itself within about 20 ft. of the stack. The same water used in the manufacturing process is also used in the pollution control system. (Jernigan-Vanderbilt) W75-03631

DAIRY MANURE MANAGEMENT METHODS. Washington State Univ., Pullman. Environmental

Engineering Section. D. E. Proctor.

Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 441, \$4.75 in paper copy, \$2.25 in microfiche. Report No EPA/530/SW-67d, 1974. 128 p, 34 fig, 1 tab. 5 append. G06-EC-00102.

Descriptors: *Farm wastes, *Management, *Dairy industry, *Waste disposal, On-site investigations, Research facilities, Agriculture, Anaerobic condi-tions, Lagoons, Data collections, Storage, Seasonal, Environmental effects, Land use, Crop response, Sprinkler irrigation, Slurries, Hydraulic transportation, Cattle, *Waste treatment.

New pens for the confinement and feeding of dairy cattle were constructed under a continuous roofed area to prevent the addition of precipitation to the cattle excrement. The manure was collected in underground sumps, pumped to large anaerobic lagoons for wet-season storage, and subsequently applied to crop land during the comparatively drier summer months. Observations were made to evaluate, at least partially, the effect of the roofed environment upon the cattle. Some unseccessful attempts were made to collect the excrement by hydraulic flushing techniques alone. The pump and pipeline transport of manure slurry either to storage or to large bore field irrigation nozzles was quite successful. Observations of surface ponding and runoff, soil penetration, and crop response indicated that the concept of seasonal storage and seasonally scheduled crop land disposal of dairy manure slurry can be an environmentally acceptable and agriculturally compatible method of dairy manure management. Attempts to aerobically treat manure slurry supernatant liquor were technically successful but still impractical. Weather data and soil and water quality data were tabulated in ap-pendixes. Also included were reports on the postexperimental operations, planning and implementation of required facilities and equipment, and construction progress and problems. (Humphreys-W75-03636

APPARATUS FOR BIOLOGICALLY PURIFY-ING EFFLUENT,

A. F. J. C. Stengelin, V. Stengelin, and J. Stengelin.

US Patent No 3,847,811, 3 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 743, November 12, 1974.

Descriptors: *Patents, *Biological treatment, *Aerobic treatment, *Waste water treatment, Water pollution control, Pollution abatement, Water quality control, Equipment, Microorganisms, *Trickling filters, Effluent, Aerobic treatment

Identifiers: Aerobic microorganisms.

The apparatus for biological treatment of effluent by the use of aerobic microorganisms has at lease one trickling filter. The filter is mounted on a shaft. The individual sections of the filter are immersed successively in the effluent during rotation of the shaft. The filter comprises several annular, segment-shaped or cube-shaped filter sections arranged side by side around the shaft. Passages present a large area into which the effluent penetrates on immersion and from which the ef-fluent drains away again when reemerging. (Sinha-OFIS) W75-03734

METHOD AND APPARATUS FOR PROCESSING WASTE WATER SLIMES OF STEEL MILL WATER TREATMENT SYSTEMS,

US Patent No 3,844,943, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2094, October 29, 1974.

Descriptors: *Patents, *Waste water treatment, *Filters, Pollution abatement, Water pollution control, Water quality control, *Slime, *Oil wastes, Iron oxides, *Separation techniques, *Industrial wastes, Filtration. Identifiers: Magnetic separators, Steel mills.

A method and apparatus are presented for processing a stream of water from a steel mill water treatment system where the water contains iron oxides, liquid oils, heavy oil particles, a slime of finely divided particles of waste materials, and water. The stream is first passed through an operation where a rough separation is made between the lighter components such as slime and oil and the heavier components such as the iron oxides, the heavy oil particles and much of the fine waste particles. The heavier particles are then passed through a classifier where again the heavier components are separated and the lighter oil, slime and water are discarded, after which the heavier material is again passed through a combined scrubber and classifier where extra water and oil solvent are added and the heavier material discharged from this operation, mostly iron oxide, is discharged to oxide storage. Again, the lighter oil slime and water are discharged. All of the oil, slime and water from these previous operations are passed to a thickener where the remaining solids in the stream are settled to the bottom by continuous non-turbulent agitation and liquid oil and water are removed at the top and separated from each other. The solids discharged from the thickener are forced by means of a pump serially through a magnetic separator and a cake filter, the oxides removed in the magnetic separator are discharged to the oxide storage and the cake from the filter is discharged to a filter cake storage. The filtrate from this filter is again discharged back to the thickener. (Sinha-OEIS) W75-03740

WASTEWATER TREATMENT SYSTEM WITH PARTIAL REUSE AND IN-FREQUENT DOSING TO SOIL, Environment/One Comp. 1 viv.

R. P. Farrell, Jr.

U. S. Patent No. 3,844,946, 8 p, 2 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2095, October 29, 1974.

Descriptors: *Patents, *Waste disposal, *Waste water treatment, *Aerobic treatment, Chemical treatment, Effluents, Equipment, Recycling, Conservation, *Water reuse, *Soil disposal fields, Settling business Identifiers: Dwellings, Settling tanks, Drain fields.

A waste disposal system, particularly for dwellings having limited drain fields or drain field soils having limited capacity, is described. The effluent is removed from an aerobic treatment and settling tank for ultimate return (at least in part) as flushing fluid for toilets, etc. The sludge is removed from the treatment and settling tank for further treatment and settling so that liquid may be removed from the sludge for return ultimately to the treatment and settling tank. The effluent used for flushing purposes is run into a storage tank, and thereafter may be chemically treated by a treatment solution educator and stored in the surge tank supplying the toilets until it is used by the toilets in flushing. Waste water from toilets and other sources is deposited in a small holding tank other sources is deposited in a small holding tank until a predetermined level has been reached, at which time a grinder-pump will remove the waste from the holding tank and discharge it into the aerobic treatment and settling tank. The liquid removed from the sludge is returned to this holding tank. Various pressure and level sensing controls are used in conjunction with a coordinating and timing control unit to control the sequence of operations for efficiency. Excess effluent is discharged to a drain field or the like, in infrequent slug doses in a known manner to thereby enhance performance of any drain field of a given capacity. (Sinha-OEIS) W75-03741

POWERED MOBILE SPRAY IRRIGATION FOR PRODUCTIVE CROP SEWAGE UTILIZATION,

U. S. Patent No. 3,844,481, 9 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1953, October 29, 1974.

Waste Treatment Processes—Group 5D

Descriptors: *Patents, *Irrigation systems, *Sewage disposal, Liquid wastes, *Sprinkler ir-rigation, Equipment, Conservation, Puddling, *Water reuse, *Waste water disposal, Water con-

A mobile, self-propelled rotary irrigation rig uses liquid sewage to irrigate crop lands. The system is designed to avoid puddling. The rig includes a pivot tower, a conduit pivoting about the tower, a series of supports spaced along the length of the conduit, and a series of nozzles spaced along the conduit. The conduit moves so that the nozzles move in arcs to gradually and progressively irrigate adjacent circular sectors. (Sinha-OEIS) W75-03743

TREATMENT OF SEWAGE, Sanitas Co. Ltd., London (England). (assignee) J. H. Stokes, and A. G. Cousins. U. S. Patent No. 3,846,301, 4 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 264, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, "Sewage treatment, Pollution abatement, "Disinfection, Chlorination, Bleaching wastes, Effluents, Water pollution control, Water quality control, "Separation techniques, "Chemical treat-

ment.

Identifiers: Deodorizing, Sterilization, Calcium hypochlorite, Caustic alkali, Decoloration.

Sewage is treated by the following steps: (a) Form a mixture of flushing liquid and sewage (b) Separate the mixture into a part which has a high content of solid matter and a part which has a high content of liquid (c) Separate solid matter from liquid in the part with the high liquid content (d) Maintain a chemical composition in that liquid such that the liquid is disinfectant and deodorant (e) Maintain a bleaching action in the liquid so as to have a decolorizing effect (f) Use the liquid as flushing liquid for a repetition of the mixing step (g) Subject the part with high solid content to mechanical reduction of size of pieces of the solid matter (h) Thereafter hold that part in a place of storage, so that substantially all the solid matter is exposed to the chemical content of the liquid constituent of that part and is thereby broken down, dispersed, sterilized and deodorized. (Sinha-OEIS) W75-03746

ROTATING FILTER FOR WASTEWATER BIOLOGICAL PURIFICATION.

U. S. Patent No. 3,837,492, 3 p, 10 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 926, No 4, p 1266, September 24, 1974.

Descriptors: *Patents, *Filters, Waste water treatment, Water purification, Water pollution control, Water quality control, *Aeration, Pollution abatement, *Biological treatment, Equipment.
Identifiers: Rotating filters.

The rotating filter comprises at least one assembly of parallel open-ended elongated channels, and a shaft having an axis of rotation about which at least one assembly can rotate. The axis of rotation is to be perpendicular to the elongated channels. The assembly of channels is rotated so that it is periodically in contact with the wastewater and then with the atmospheric oxygen. A biological film develops on the surfaces of the filter. When the filter rotates submerged in the wastewater, the biological film absorbs the organic pollutants present in the same wastewater. When the filter rotates out of the wastewater, the organic pollurotates out of the wastewater, the organic pollu-tants, absorbed by the biological film, are exposed to the oxygen in the air. The natural oxidation transforms the organic pollutants into metabolic products. As the biological film grows, the excess of the film continuously sloughs off the surfaces

of the filter, falling by gravity in the bottom of the tank. (Sinha-OEIS)

RECLAMATION OF HYDROCARBON CON-TAMINATED GROUND WATERS,

Sun Research and Development Co., Philadelphia, Pa. (assignee) R. L. Raymond.

U. S. Patent No. 3,846,290, 3 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 260, November 5, 1974.

Descriptors: *Patents, *Groundwater, *Oil wells, Pollutants, *Biodegradation, *Oil pollution, Water wells, *Injection wells, Pollution abatement, Microorganisms, Nutrients, Oxygen, Reclama-tion, *Waste water treatment, Water reuse.

Hydrocarbon contaminants of underground water sources can be quickly disposed by providing nutrients and oxygen for hydrocarbon-consuming microorganisms normally present in underground waters. Nutrients and oxygen are introduced through wells within or adjacent to the contaminated area and water is removed from the contaminated area until the contaminating hydrocarbons are no longer present or are reduced to an ac-ceptable level. A contaminated producing well will yield hydrocarbon contaminated water due to the presence of hydrocarbons in the water. A second well may be specifically drilled within the contaminated area and adjacent the producing well to be employed as an injection well. At ground level, the injection well will be equipped with a mixing tank for the nutrients and an injection tube extend-ing from the tank to the water level for introducting the nutrients to the subsurface water. An air pump pumps air through a conduit to below the water level. A pump at the producing well removes water from the well through a submerged conduit. The normal microorganism flora between the in-jection well and the producing well will thus have sufficient nutrients and oxygen to effectively feed on the hydrocarbon substrate present in the area between the wells and decomposition of the un-wanted hydrocarbon will proceed. (Sinha-OEIS)

WASTE TREATMENT PROCESS,

J. S. Jeris, C. Beer, and J. A. Mueller. U. S. Patent No. 3,846,289, 4 p., 1 fig, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 260, November 5, 1974.

Descriptors: *Patents, *Denitrification, *Waste water treatment, Pollution abatement, Water pol-lution control, Water quality control, *Biological treatment, Bacteria, Nitrates, Nitrites, Specific gravity, Temperature, Carbon, Pseudomonas, Hydrogen ion concentration.

A process for denitrifying waste water includes generating a fluidized bed containing denitrifying biota on a particulate carrier, metering a carbon source into the waste water and mechanically removing excess bacterial growth from the carrier at predetermined intervals. The fluidized bed through which the influent waste water is passed is contained in an upright cylindrical column. Waste water enters the column through a distribution manifold in its base. A cylindrical manifold plate having a series of spaced apart holes may be employed to regulate and even the flow of waste water through the column. To perform the process of fluidized bed formed from denitrifying biota attached to a solid particulate carrier or substrate is generated. For optimum denitrification each bed particulate preferably has a thin layer of bacteria seeded thereon. Generally, the bed particles are first cultured to seed bacteria, such as pseudomonas. The specific gravity of such seeded par-ticles must be no less than about 1.1 and preferably greater than about 1.20 in order to insure that such particles are not carried out of the system during operation. In general, the pH of the system is adjusted, if need be, to fall in the range of from about 5.5 to 9.5. Enhanced results are obtained and, accordingly, it is preferred to operate at a pH from about 6.5 to 8.5. The temperature of the fluidized bed environment should be sufficient to permit bacterial activity. Usually, it is kept at from about 5 to 45C. There must be sufficient levels of carbon in the feed influent in order to provide stoichiometric amounts of carbon to permit oxidized nitrogen to be reduced to nitrogen. (Sinha-OEIS) W75-03751

PROCESS OF AND INSTALLATION FOR PURI-FYING SEWAGE,

C. Brucker.

C. Dieser.
U. S. Patent No. 3,846,291, 5 p, 7 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, *Aeration, *Biological treatment, *Waste water treatment, Water purification, Water pollution control, Water quality control, Pollution abatement, Microorganisms, Sewage treatment, Equipment, *Sludge treatment, *Recycling, Water reuse.

Sewage is introduced into a basin through an intake located at its upstream end. It is allowed to flow toward the downstream end. A travelling bridge is mounted for reciprocating movement along the basin between both ends. Sludge aerating and recycling devices are mounted on the bridge forming a sludge circuit including a suction intake located adjacent to the bottom of the basin. A suction pump is used for drawing the sludge from the bottom of the basin through the suction intake. The sludge is sprayed into the air toward the upstream end of the basin. The sludge is thus continually recycled in an upstream direction counter to the downstream flow of the progressively treated sewage. (Sinha-OEIS) W75-03752

EJECTOR AERATED OXIDATION DITCH FOR

WASTE TREATMENT, Kimberly-Clark Corp., Neenah, Wis. (assignee)

A. R. Lecompte, Jr.
U.S. Patent No. 3,846,292, 5 p, 4 fig, 3 tab, 9 ref;
Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Oxidation lagoons, Water quality control, Water pollution control, Pollution abatement, Sludge, Settling basins, Suspended solids, Liquid wastes, Biochemical oxygen demand. Identifiers: *Oxidation ditch.

A system for treating waste liquid containing set-tleable solids and BOD comprises: an oxidation ditch for confining and retaining the waste liquid and defining a continuous, substantially closed flow path through which the confined liquid is moved and providing for a liquid depth of at least about 10 feet; and ejectors for aerating the waste liquid in the ditch to reduce the BOD and for simultaneously moving the waste liquid through the flow path. The ejectors are constructed and arranged so that they are solely capable of circulat-ing the waste liquid throughout the ditch at a velocity of at least 0.3 foot per second to maintain the settleable solids in suspension. The ejectors comprise a housing having a waste liquid inlet for receiving a stream of pressurized waste liquid, a high velocity waste liquid nozzle connected with the waste liquid inlet, an air inlet for receiving air, a mixing chamber connected with the waste liquid nozzle and the air inlet, and a discharge outlet for discharging a high velocity waste liquid-air jet. The ejectors are arranged to discharge the waste liquid-air jets at least about 9 feet below the surface of the waste liquid in the oxidation ditch and in the direction of movement. (Sinha-OEIS)

Group 5D—Waste Treatment Processes

LIQUID WASTE TREATMENT,

S. J. Campbell.

U.S. Patent No. 3,846,293, 8 p, 3 fig, 4 tab, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 261, November 5, 1974.

Descriptors: *Patents, Liquid wastes, *Waste water treatment, *Coagulation, *Flocculation, Pollution abatement, Water pollution control, Water quality control, Lime, Polyelectrolytes, *Chemical treatment Identifiers: Ferric chloride.

Liquid waste is subjected to a multi-phase chemical-physical treatment process. In the first or densifying phase, the waste is treated with a first charge-density reducing agent, preferably an inor-ganic salt having a trivalent cation and most preferably ferric chloride, to reduce the zeta potential of the particles to a value at which some of the more easily removed, suspended particles coagulate and partially flocculate. These coagulated and partially flocculated particles are maintained in suspension in the liquid and are trans-ferred together with the liquid to a succeeding treatment phase, wherein a sufficient quantity of a second charge-density reducing agent, preferably an inorganic salt having a divalent cation, and most preferably lime, is added to impart to the a charged-density such that substantially all of the suspended particles flocculate or ag-glomerate into masses or particles which can be removed readily from the liquid. These flocculated impurities can be removed from the liquid waste in this phase of the treatment process. It is preferable to add a polyelectrolyte, along with the divalent inorganic salt, to the liquid waste containing the floc produced in the densifying phase. (Sinha-OEIS) W75-03754

WASTE WATER PURIFICATION SYSTEM,

W. C. Hay.

U.S. Patent No. 3,846,296, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 262, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, Descriptors: "Patents, "waste water treatment, Filtration, Folloculation, Pollutants, Water pol-lution sources, "Biological treatment, Water pollu-tion control, Water quality control, Equipment, Industrial wastes, Domestic wastes, Suspended solids, Irradiation.

Identifiers: Activated charcoal, Gamma radiation, Dissolved organic matter.

Waste water from industrial and/or domestic sources is passed through a filtering stage then through conventional treatment as at a biological treatment station in which the waste water is exposed to organic flocculent materials to break down organic solids suspended in the waste water and then this treated waste water is filtered through a bed of sand. This treatment removes the major portion of the suspended solid materials from the waste water. Then, the waste water is passed through a bed of activated charcoal contained within an irradiation tank upon which organic contaminates dissolved within the waste water are deposited. The absorbent activated charcoal is regenerated by means of gamma radiation issuing from an energy basket contained within the radiation tank which holds the activated charcoal. The tank is surrounded by a heavy shield of concrete material and the entire shielded structure is submerged within a tank of water to prevent radiation escape. (Sinha-OEIS) W75-03755

WATER POLLUTION RESEARCH IN CANADA

Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.

Excerpts from Proceedings of 8th Canadian Symposium on Water Pollution Research, February 1973, held at Waterloo Univ., Ontario, Vol 8, 238

Descriptors: *Water pollution, *Canada, *Waste reatment, *Sewage treatment, Organic matter, Effluents, Systems analysis, Sludge disposal, Sludge, Activated carbon, Sludge treatment, Outfall sewers, Urban runoff, Jets, Diffusion, Flow characteristics, Leaching, Sludge digestion, Or-ganic acids, Activated sludge, Waste water treatment, Toxicity, Heavy metals, Phytoplankton, Anaerobic digestion, Iron compounds, Phosphates, Phenols, Landfills, Oxidation. Identifiers: Alum sludge, Synergistic interactions. Iron phosphate.

Thirteen papers chosen from those presented at the Eighth Canadian Symposium on Water Pollution Research, held at the University of Waterloo in February 1973 appear in this volume. Five deal with metals-toxicity of heavy metals to phytoplankton, anaerobic digestion of primary sludge containing iron phosphate, use of activated carbon to remove trace metals from wastewater, effects of aluminum sludge from water purification plants on municipal primary sewage, and heavy metal tolerance in algae from polluted lakes. Other papers deal with size distribution of dissolved organics in effluents, study of pollution loadings from urban runoff, and performance of aerobic sludge digestion. Also included are papers on phenol removal in wastewater by wet air oxida-tion, boundary effects on dilution of buoyant jets, phosphorus leaching from sewage sludge used as landfill, and wet air oxidation of low molecular weight organic acid. (See W75-03771 thru W75-03783) (Jones-Wisconsin) W75-03770

DETERMINATION OF THE SIZE DISTRIBUTION OF DISSOVED ORGANICS IN EF-

McMaster Univ., Hamilton (Ontario). Dept. of

Chemical Engineering. L. A. Addie, K. L. Murphy, and J. L. Robertson. In: Water Pollution Research in Canada 1973, Vol 8, p 1-15, 7 fig, 2 tab, 13 ref.

Descriptors: *Waste water treatment, *Organic matter, *Analysis, Tertiary treatment, Effluents, Separation techniques, Filters, Biological treatment, Chromatography.

Identifiers: Fractionation, Gel filtration chromatography, Molecular size, Molecular weight.

Problems concerning molecular size information on organic matter found in wastes and treated ef-fluents are examined and the extent to which this information may be useful in analysis of organic waste constituents is illustrated. Size distributions of the residual organics in secondary effluents were determined using gel filtration with dif-ferential ultraviolet and refractive index detection and automated organic carbon and chemical oxygen demand analyses. Samples from activated sludge treatment were filtered, acidified, and purged with purified nitrogen to remove bicarbonate alkalinity. The concentrate was adjusted to pH 5.2-5.5 filtered prior to being applied to the chromatograph for size distribution. Separation into components is possible on the basis of Stokes radius but not by molecular weight for the unk-nown organics in wastes and effluents. Identification is possible qualitatively but not quantitatively by UV. Use of COD and refractive index to detect organic components is not a valid procedure for analyzing wastewater and effluents. Inorganics influence the separation either by changing the ap-parent Stokes' radius (conformation) or through the Donnan salt exclusion effect. Effluents from three plants had similar proportions of carbon in three distinct molecular size ranges. Each size range included acidic, basic, and neutral fractions. (See also W75-03770) (Jones-Wisconsin)

A PERFORMANCE STUDY OF AEROBIC SLUDGE DIGESTION.

Toronto Univ. (Ontario). Dept. of Civil Engineer-

K. S. Hogg, and J. Ganczarczyk. In: Water Pollution Research in Canada 1973, Vol 8, p 26-35, 3 tab, 10 ref.

Descriptors: *Aerobic treatment, *Sludge digestion, *Economic efficiency, Canada, Waste treatment, Operations, Design, Cost comparisons, Evaluation, Capital costs, Treatment facilities. Identifiers: Dunnville(Ontario).

An evaluation of a full-scale single-stage aerobic digester in the sewage treatment plant in Dunnville, Ontario was conducted during the summer of 1972. Parameters for evaluating aerobic digestion process performance from actual field study determined and design and operational charac-teristics investigated with the results compared to other full-scale plants of similar size, and the capital and operational costs associated with aerobic and anaerobic sludge digestion compared. The aerobic digestion system for the sewage treatment plant in Dunnville is operating efficiently. Performance of the Dunnville digester cannot be judged on the basis of the volatile solids removal. The specific oxygen uptake rate in mg oxygen/g VSS/hr which is temperature dependent is one of the most reliable indicators of the biological activitry of aerobically digested sludge. Within the context of this study, economical comparison of anaerobic versus aerobic digestion tends to favor aerobic digestion for small activated sludge plants. The cost of power for supplying high volumes of air to the Dunnville aerobic digester was not economically restrictive. Annual power costs as-sociated with aeration of the aerobic digester contents represents 2.5% of the total annual budget for this treatment plant. (See also W75-03770) (Jones-Wisconsin) W75-03773

DISPOSAL OF ALUM SLUDGE TO THE EXIST-ING ACTIVATED SLUDGE WASTEWATER TREATMENT PLANT, McGill Univ., Montreal (Quebec). Dept. of Civil

Engineering. D. Y. Hsu.

In: Water Pollution Research in Canada 1973, Vol 8, p 36-67, 22 fig, 21 ref.

Descriptors: *Sewage disposal, *Activated sludge, *Waste water treatment, Municipal wastes, Sewers, Phosphates, Anaerobic digestion, Dewatering, Sludge. Identifiers: *Alum sludge.

One of the most promising methods of handling sludge from the alum coagulation process is to discharge it to the sanitary sewers. The qualitative and quantitative effects on the mechanism of each unit of an activated sludge wastewater treatment plant when alum sludge was added, at various con-centrations, were determined. It was found that the crucial effects were the increase in sludge production, either in the primary settling tank or in the secondary settling tank, and the retardation of the digestibility of the wastewater sludge. These effects were significant only when the aluminium hydroxide concentrations added were beyond certain limits. The efficiency of wastewater treat-ment, in terms of removal of organic matter, suspended solids, and phosphate and the sludge dewatering could be improved. Conclusions are that it is feasible to discharge alum sludge into sanitary sewers and treat it in the existing activated sludge wastewater treatment plant. How-ever, it should be discharged into the sewer at a suitable rate to decrease strength of the adverse effects of aluminium hydroxide and the water treatment plant wastes should be discharged into a thickener in the wastewater treatment plant. (See also W75-03770) (Jones-Wisconsin) W75-03774

ANAEROBIC DIGESTION OF PRIMA SLUDGE CONTAINING IRON PHOSPHATE. Waterloo Univ. (Ontario). Dept. of Civil Engineer-

M. E. Jack, G. J. Farquhar, and G. M. Cornwall. In: Water Pollution Research in Canada 1973, Vol 8, p 91-109, 10 fig, 4 tab, 25 ref.

Descriptors: *Waste treatment, *Anaerobic digestion, *Sewage sludge, *Iron, *Phosphorus, Nutrient removal, Solubility, Phosphates. Identifiers: *Primary sludge, *Iron phosphate.

The digestibility of sludges containing metallic phosphate precipitates and about the fate of these precipitates during the anaerobic digestion process particularly as to whether or not phosphorus is returned into solution was investigated. The effect of storage on iron phosphate sludge was first investigated. Storage of the iron phosphate primary sludge at 5C resulted in rapid increases in orthophosphate, total soluble iron and volatile acids concentrations. Since the concentrations of orthophosphate in the fresh iron phosphate primary sludge were several times greater than those of both the raw sewage and the primary effluent, it was concluded that solubilization of phosphorus had begun in the primary clarifier. The stored iron phosphate sludge was usccessfully digested anaerobically after dilution to about 60% of its original strength. Precipitation rather than solu-bilization of iron phosphate was observed during anaerobic digestion. The digester effluent contained less than 7 mg/l as P or orthophosphate and less than 4 mg/l as Fe of total soluble iron. (See also W75-03770) (Jones-Wisconsin) W75-03776

REMOVAL OF TRACE METALS FROM WASTEWATER BY ACTIVATED CARBON, Univ., Hamilton (Ontario). Dept. of Chemical Engineering.

A. Netzer, and J. D. Norman. In: Water Pollution Research in Canada 1973, Vol

Descriptors: *Waste water treatment, *Metals, *Activated carbon, *Inorganic compounds, Aluminum, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Hydrogen ion concentration. Identifiers: Silver.

8, p 110-121, 1 fig, 2 tab, 18 ref.

Experiments were carried out on stock solutions with initial metal concentrations of about 100 ppm and about 10 ppm to assess the possibility that ac-tivated carbon treatment would remove aluminum, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, and zinc from wastewater. All metals studied were tested over the pH range 3-11. In this experiment the greatest removal was obtained by a combined process using pH adjustment followed by activated carbon treatment. Less than 0.1 ppm residual metal con-centration was obtained for all the metals investigated (except aluminum) over the pH range 4.0 to 10.0. Results are tabulated. The removal of heavy metals by adsorption on activated carbon was proven to be feasible, for greater than 99.5% removal was achieved by pH adjustment and ac-tivated carbon treatment for most of the metals tested. This has shown that the higher the activated carbon to metal ratio, the better the removal will be, and over a broader pH range. Because of the relatively high cost of activated carbon, this method will only be economically feasible for residual metal concentrations. (See also W75-03770) (Jones-Wisconsin) W75-03777

THE EFFECTS OF ALUMINUM SLUDGE FROM WATER PURIFICATION ON MUNICIPAL PRIMARY SEWAGE TREATMENT, Royal Military Coll. of Canada, Kingston (Ontario). Dept. of Civil Engineering. J. D. O'Blenis, and T. R. Warriner. In: Water Pollution Research in Canada 1973, Vol 8, p 122-147, 16 fig, 4 tab, 5 ref.

Descriptors: *Sewage treatment, *Water purification, *Sludge disposal, Filtration, Pilot plants, Nutrient removal, Phosphates. Identifiers: Alum sludge

Sludges from two different water purification plants were tested along with alum and a combina-tion of alum and water purification sludge, for their effects on the removal of suspended solids, chemical oxygen demand, and phosphates. Results indicated that the two water treatment plant sludges did not impair sewage treatment at dosages up to about 10% of hydraulic flow. Both sludges exhibited a capability for removal of phosphate from domestic sewage. In the range of 75% to 98% relative phosphate removal, sludge dosages are seven to nine times as large as those required using alum (as aluminum). The sludges decreased in their phosphate removal capacity following successive exposure to sewage. The use of alum and sludge together enhances the phosphate removal performance of each, with combined removals greater than the cumulative effects of each if used separately. Recycling the clarifier un-derflow sludge reduces the dosing requirements of water treatment alum sludge for a specific phosphate removal objective. Suspended solids phosphate removal objective. Suspended solids performance of primary clarifiers may be enhanced by sludge addition providing solids overtoad is avoided. Chemical oxygen demand reductions across the pilot primary clarifier, compared with undosed operations, were improved approximately 100% by addition of waterplant sludge. (See also W75-03770) (Auen-Wisconsin) W75-03778

REMOVAL OF PHENOL IN WASTE WATER

BY WET AIR OXIDATION,
Ottawa Univ. (Ontario). Dept. of Chemical Engineering. B. B. Pruden, and D. R. Ferguson.

In: Water Pollution Research in Canada 1973, Vol 8, p 148-167, 11 fig, 20 ref.

Descriptors: *Waste water treatment, *Oxidation, *Phenols, Organic matter, Energy, Mass transfer, Chemical reactions, Mathematical models, Energy conversion. Identifiers: *Wet air oxidation, Unmixed reactors,

Zimmermann process. Steam energy.

Treatment of waste waters containing phenols by conventional methods poses some unique problems: at 80-100 ppm, phenol is a food for bac-teria and can be oxidized in an activated sludge plant, whereas at concentrations above 200 ppm it is a bactericide, necessitating waste dilution be-fore treatment. The wet air oxidation process has been applied to the continuous oxidation of phenol in dilute solutions and was shown to be effective in converting up to 99.5% of the phenol to carbon dioxide and water, in a simple unmixed reactor. A mathematical theory has been adapted which allows all of the data to be plotted on one graph for one temperature from which the effect of mass transfer and chemical reaction can be obtained. The effects of imperfect mixing, phenol distilla-tion, and gas humidification on the use of correct terms in the equation are discussed. At high concentrations mass transfer control can be neglected whereas at low concentrations chemical reaction control can be neglected supporting the thesis that 'no mixer may be required' with the qualification that the reactor concentration, determined by the pressure, temperature, and residence time be sufficiently low. This process in a continuous flow system is feasible and workable, with possible ap-plication to water pollution control. (See also W75-03770) (Auen-Wisconsin) W75-03779

BOUNDARY EFFECTS ON DILUTION OF BUOYANT EFFECTS ON DILUTION OF BUOYANT JETS, Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science. For primary bibliographic entry see Field 8B. W75-03780

HEAVY METAL TOLERANCE IN ALGAE ISO-LATED FROM POLLUTED LAKES NEAR THE SUDBURY, ONTARIO SMELTERS.

Toronto Univ. (Ontario). Dept. of Botany For primary bibliographic entry see Field 5C. W75-03781

PHOSPHORUS LEACHING FROM SEWAGE SLUDGE USED AS A LANDFILL, Windsor Univ. (Ontario). Dept. of Chemical En-

P. K. Wadehra, and M. Adelman.
In: Water Pollution Research in Canada 1973, Vol

Descriptors: *Nutrient removal, *Phosphorus, *Sewage sludge, *Leaching, Landfills, Wastreatment, Waste disposal, Anaerobic digestion.

The effect of anaerobic digestion on total phosphorus present as soluble and insoluble phosphates in raw sludge, the effect of the addition of chemicals on the total soluble and insoluble phosphates when it is digested anaerobically, and the effect of water on the phosphorus release from the dried sludge, as it might be used as landfill, was investigated. It was concluded that during anaerobic digestion of raw sludge, a large portion of the total soluble phosphates present is converted to an insoluble form. The ratio of orthophosphate to condensed phosphate in the effluent digested sludge was roughly equal to that in the raw sludge, indicating that anaerobic digestion was unfavorable for any significant conversion of one phosphate form to another. The amount of phosphorus released from the sludge cake to water is independent of pH at pH 4.0 and 9.0, and was greatly reduced when the sludge was anaerobically digested. Phosphorus release to water was greatly reduced when the raw sludge was treated with either ferric chloride or alum, with the alum producing a somewhat greater insolubilization effect than the ferric chloride. The addition of ferric chloride or alum to the sludge before anaerobic digestion only slightly improved the phosphate in-solubilization. (See also W75-03770) (Auen-W75-03782

WET AIR OXIDATION OF LOW MOLECULAR

WEIGHT ORGANIC ACIDS,
Waterloo Univ. (Ontario). Dept. of Chemical En-

gineering. P. E. L. Williams, D. C. Day, R. R. Hudgins, and P. L. Silveston.

In: Water Pollution Research in Canada 1973, Vol 8, p 224-236. 7 fig, 12 ref.

Descriptors: *Sewage treatment, *Sludge treatment, *Oxidation, *Kinetics, Organic matter, Mass transfer, Organic acids, Equations. Identifiers: *Wet air oxidation, Zimmermann Process

A kinetic study of wet air oxidation, using propionic acid, identified the kinetic-control regime, developed a rate equation model, and investigated the oxidation mechanism. Results in-dicated that wet air oxidation of the lower carboxylic acids appears to be kinetically rather than diffusion controlled under normal operating tempera-tures from 300 to 600C. Oxidation apparently occurs only in the liquid phase and is predominantly homogeneous. Rate studies suggest that reaction is not first order in acid or oxygen. The activation energy for propionic acid oxidation was found to be about 62 kcal/gmole. Acctaldehyde was found to be an intermediate in the oxidation of both butyric and propionic acid. Attack at the alpha car-bon of the carboxylic acid is indicated by the results. Acetic acid is found in large quantities when oxidation is incomplete because it is oxidized much more slowly than higher members of its homologous series. The induction period, the scatter of the data, and the presence of small amounts of low molecular weight hydrocarbons in-

Group 5D—Waste Treatment Processes

dicate a free radical mechanism is involved in wet air oxidation. (See also W75-03770) (Auen-

RECYCLING MILLING WATER IN MISSOU-RI'S NEW LEAD BELT, Cominco American, Inc., St. Louis, Mo.

F. H. Sharp, and K. L. Clifford. Mining Engineering, Vol 25, No 7, p 68-72, July 1973. 2 fig, 3 tab.

Descriptors: *Water reuse, *Mine water, *Froth flotation, *Lead, *Mineral industry, Metals, Zinc, Copper, Industries, Mining, Mills, Frothing, Reclaimed water, Industrial wastes, *Recycling,

Tests were run at two mines in dry areas of Missouri's New Lead Belt which must rely on water reclaimed from their tailings lake to augment the mine water. In the mills in this study, lead concen-trate is the principal product with lesser amounts of zinc concentrate and copper concentrate. One mine has a tailings lake with a theoretical retention time of 6 months. The return water will not produce a persistent froth, however, minute amounts of alcohol or glycol frother produce volu-minous froth. Oily oxidation products in reclaimed water can seriously handicap the separation of copper from lead in milling. Control of pH is necessary to keep heavy metals concentrations low and prevent sphalerite activation when the water is returned to the mill. Another mine has had success with recycling mill water over a test period of six months. By comparing mill tails COD with recycle water COD, an indication of degradation or buildup is possible. (Pulliam-Vanderbilt) W75-03799

CATEGORY VERSUS SUCCESSIVE-INTER-VALS SCALES,

California Univ., Berkeley. School of Public Health.

For primary bibliographic entry see Field 6B. W75-03802

THE EFFECT OF INCORPORATING HEN MANURE INTO THE DIET OF CHICKS,
Florida Univ., Gainesville, Dept. of Poultry

D. R. Sloan, and R. H. Harms. Poultry Science, Vol 52, No 2, p 803-805, March, 1973. 3 tab, 4 ref.

Descriptors: *Farm wastes, *Poultry, Diets, Peeds, Proteins, Growth rates, Performance, *Waste treatment, Waste disposal. Identifiers: *Refeeding, Manure recycling, Chicks, Air-dried hen manure, Feed efficiency, Growth depression, Uric acid, Feed consumption.

The effect of adding air-dried hen manure to a chick diet was studied. Two experiments were conducted using 720 day-old broiler-type chicks. In the first experiment, protein levels of 16, 20, and 24% were fed with five levels of hen feces. Manure was substituted on a pound for pound basis in the basal diet. Diets used in the second experiment contained either 20, 24 or 28% protein with three levels of manure, and 2 levels of sand. A decrease in growth was obtained with each increase in manure level. The incorporation of the manure at any level of protein was detrimental to weight gain. A decrease in growth and feed efficiency was obtained by adding either 5 or 10% hen manure to the feed. The addition of 5% sand did not influence growth or feed efficiency. When the level of sand was increased 10% a significant growth depression was obtained when the diet contained only 20% protein. However, growth was not depressed at levels of 24 or 28% protein. It would appear that some factor is present in air-dried hen manure, perhaps uric acid, which masks the bird's ability to eat and meet its energy requirements, thus having a depressing effect upon body weight gain and decreasing feed utilization. (Cartmell-East Central) W75-03814

MANURE STACK FLY BREEDING DEPENDS ON THE AMOUNT OF MANURE ADDED

Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W75-03815

REPLACES NEW WORKS 1900 INSTALLA-Water and Waste Treatment, Vol 16, No 12, p 13,

15, December, 1973.

Descriptors: *Sewage disposal, *Treatment facili-ties, Sludge, Pumping plants, Construction, Design, Filters, Filtration, *Sludge treatment, *Waste water treatment.

The complete reconstruction of the sewage disposal works at Faversham (Kent, England) is described. Before the reconstruction, the works were mainly as they had been constructed just after 1900 and tanks. Sludge settled out in the main pumping station and was desludged manually once a week and put into open sludge lagoons with no underdrainage. In 1971 alterations began on the existing pumping station involving work below Ordnance Datum and the increase in pumping capacity at that station to avoid the storm overflows functioning. The existing rising main was found to be adequate for the new flows at an increased velocity. (Merritt-FIRL)

THERMAL DRYING OF MECHANICALLY DEHYDRATED URBAN SEWAGE SLUDGE IN A BOILING LAYER SYSTEM DEHYDRATED URBAN SEWAGE SLUDGE IN
A BOILING LAYER SYSTEM
(TERMICHESKAYA SUSHKA MEKHANICHESKI OBEZVOZHENNYKH OSADKOV
GORODSKIKH STOCHNYKH VOD V
KIPVASHCHEM SLOVE),
S. V. Yakovlev, V. I. Kalitsun, and A. P. Varlygin.
Vodosnabzheniye a Sanitarnaya Tekhnika, No 12,
p. 9.1973. 4 find. 4 cef.

p 5-9, 1973. 4 fig, 4 ref.

Descriptors: *Sewage, *Sludge, *Treatment facilities, *Dehydration, Forced drying, Steam, Municipal wastes, *Waste water treatment. Identifiers: Fluidized-bed drier.

The thermal drying of mechanically dehydrated urban sewage sludge in a slot type fluidized-bed drier was studied. Small pieces of mechanically dehydrated sewage sludge were fed into an upright cylindrical space and were kept suspended over a slot by hot gas stream entering the cylinder through that slot. The dried sludge particles enthrough that stot. The dried studge particles entrained by the hot gas stream were separated by a cyclone. Slot type fluidized-bed driers were found highly suitable for the drying of urban sewage sludge at thermal efficiencies of 57-58 percent, at an initial moisture content of 60-65 percent and for nearlicle items and leaves then 20 per. The fluidized particle sizes not larger than 20 mm. The fluidized-bed height should not be less than 250 mm, and the bed height should not be less than 250 mm, and use hot gas temperature should be between 450 and 500 C. The specific fuel expenditure was found to range from 1,200 to 1,250 kcal/kg evaporated moisture. The drying capacity, determined for final moisture contents of 20-30 percent and 6-10 percent, amounts to 500-550 kg/cu m. h and to 600-650 kg/cu m. h, respectively. (Takacs-FIRL) W75-03818

CONTENT OF CHEMICAL SUBSTANCES IN FARM CROPS GROWN ON SOIL IRRIGATED WITH WASTE WATERS OF COKE BY-PRODUCT PLANTS, (IN RUSSIAN), Kiev Inst. of Nutritional Hygiene (USSR). Physicochemistry Lab.

For primary bibliographic entry see Field 5B. W75-03846

5E. Ultimate Disposal Of Wastes

WATERLESS SANITATION FOR REST AREAS, Chrysler Corp., New Orleans, La. Space Div. For primary bibliographic entry see Field 5D.

SALVAGE OF ALPHA-CONTAMINATED

METALS, Argonne National Lab., Ill. For primary bibliographic entry see Field 5D. W75-03417

TRANSURANIC SOLID WASTE MANAGE-MENT RESEARCH PROGRAMS - QUARTERLY REPORT, JANUARY-MARCH 1974. Los Alamos Scientific Lab., N. Mex. For primary bibliographic entry see Field 5A. W75-03420

CHARACTERIZATION OF ACTINIDE BEAR-ING SOILS: TOP SIXTY CENTIMETERS OF 216-2-9 ENCLOSED TRENCH, Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resources Dept. For primary bibliographic entry see Field 5B. W75-03423

POTENTIAL CONTAINMENT FAILURE MECHANISMS AND THEIR CONSEQUENCES AT A RADIOACTIVE WASTE REPOSITORY IN BEDDED SALT IN NEW MEXICO, Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 5B. W75-03425

RECOMMENDED METHODS OF REDUCTION. NEUTRALIZATION, RECOVERY, OR DISPOSAL OF HAZARDOUS WASTE, VOLUME IX, NATIONAL DISPOSAL SITE CANDIDATE
WASTE STREAM CONSTITUENT PROFILE
REPORTS - RADIOACTIVE MATERIALS, TRW Systems Group, Redondo Beach, Calif. For primary bibliographic entry see Field 5D. W75-03426

GUIDELINES FOR THE INTERIM STORAGE OF AEC-GENERATED SOLID TRANSURANIC WASTES.

Los Alamos Scientific Lab., N. Mex. For primary bibliographic entry see Field 5D. W75-03430

WATER TREATMENT PLANT WASTES DISPOSAL-PART 2, For primary bibliographic entry see Field 5D. W75-03444

MUNICIPAL WASTES - A DESIGN FOR AN IN-TEGRATED PLANT TO MAKE A PROFIT, New South Wales Univ., Kensington (Australia). School of Chemical Engineering. For primary bibliographic entry see Field 5D. W75-03531

TALKING TANKERS.

Effluent and Water Treatment Journal, Vol 14, No 6, p 323-328, June, 1974. 7 fig.

Descriptors: *Sludge, *Sludge disposal, *Fluid mechanics, Flow, Flow resistance, Gravity, Sanitary engineering, Environmental engineering, Waste disposal, Pumps.

Identifiers: *Wet waste tankers, Positive displacement pump, *Vacuum pumps.

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Choosing the correct wet waste tanker for different situations is discussed. The basic requirements must be defined but the supplier should be left with some flexibility so to offer the best equipment for the job, within the specified limits, bearing in mind cost and availability. The simplest tanker is the unit which uses gravity for both filling and discharge. The advantages of this type are the largest possible carrying capacity, the low initial cost, and the virtually free maintenance. The disadvantages are that there must be some external source for filling and the contents cannot be self-pumped into above-ground storage tanks. The other types of tanks use pumps singly or in combination either with other pumps or with gravity. Two types of pumps are relevant - the vacuum pump and the positive displacement pump. The vacuum pump is used in the case of corrosive, abrasive, or high solid content wastes because the liquid does not pass through the pump. The overall design of the tankers is also discussed. (Orr-FIRL) W75-03560

SOME ASPECTS OF TREATMENT AND DISPOSAL OF BIOLOGICAL AND NON-BIOLOGICAL SLUDGES OF THE PAPER AND BOARD INDUSTRY (EINIGE ASPEKTE DER BEHANDLUNG UND BESEITIGUNG VON BIOLOGISCHEN UND NICHTBIOLOGISCHEN SCHLAEMMEN DER PAPIER- UND KARTONINDUSTRIE), Cellulose Attishoiz A.G., Solothurn (Switzerland).

Cellulose Attisholz A.G., Solothurn (Switzerland) For primary bibliographic entry see Field 5D. W75-03580

PROBLEM-FREE CLARIFIER SLUDGE TREATMENT BY A NEW THERMAL TWO-STAGE PROCESS (PROBLEMLOSE KLAERSCHLAMMBEHANDLUNG DURCH EIN NEUES THERMISCHES ZWEISTUFEN-VERFAHREN).

For primary bibliographic entry see Field 5D. W75-03609

GUIDELINES FOR DEVELOPMENT OF CRITERIA FOR CONTROL OF OCEAN WASTE DISPOSAL.

Interstate Electronics Corp., Anaheim, Calif. Available from the National Technical Information Service, Springfield, Va. 22161, as PB-233 019, \$4.75 in paper copy, \$2.25 in microfiche. Report No IEC-4460C1544, February 1974. 86 p, 16 fig, 4 tab. EPA 68-01-0796.

Descriptors: *Waste disposal, *Monitoring, *Oceans, *Surveys, Coasts, Continental shelf, Continental slope, Management, Sites, Industrial wastes, Municipal wastes, Dredging, Water pollution control, Regulation, Liquid wastes, Disposal operations, *Water quality standards. Identifiers: *Dredge spoil disposal, Dredge spoil.

This is the final report of a group of successive volumes related to a survey of ocean waste disposal practices in six major coastal areas of the United States: the New York Bight; Charleston, South Carolina; the Gulf Coast between Port St. Joe. Florida, and Port Isabel, Texas; Southern California; San Francisco; and Puget Sound. Specific problems were associated with disposal site selection, criteria development and control and monitoring of disposal operations. The purpose was to assist the Ocean Disposal Program of the Environmental Protection Agency in the development of criteria for the control of ocean waste disposal. (Humphreys-ISWS)

DAIRY MANURE MANAGEMENT METHODS, Washington State Univ., Pullman. Environmental Engineering Section. For primary bibliographic entry see Field 5D. W75-03636 OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK ON SEPTEMBER 26-29, 1972). President's Water Pollution Control Advisory

Board, Washington, D.C. For primary bibliographic entry see Field 5G. W75-03697

5F. Water Treatment and Quality Alteration

LIME SLUDGE: SOME PROBLEMS--SOME SOLUTIONS, Grand Rapids Municipal Water Plant, Mich. For primary bibliographic entry see Field 5D. W75-03378

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.

Environmental Protection Agency, Atlanta, Ga. Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 215, \$7.00 in paper copy, \$2.25 in microfiche. July 1973. 192 p.

Descriptors: Water supply, *Evaluation, *Water quality standards, *Water users, Water quality, *Geogria, *Treatment facilities, Facilities, Standards, Chlorination, Distribution systems, Programs, Laboratory tests, *Potable water, Public health.

Identifiers: *Water supply surveillance, *Bacteriological surveillance standards, Regulations, Federal drinking water standards.

Program effectiveness was judged primarily on the basis of drinking water quality, adequacy and condition of water system facilities, and water supply surveillance found in a field evaluation of actual supplies. Twenty public and 81 class III (small public) supplies representing a cross-section of water supply practice were studied. Staff limitations and unresponsive administrative procedures have prevented the Water Supply Program from providing health evaluation and engineering services necessary to fulfill its responsibilities to protect residents' health. Some problems were: unmet chemical and bacteriological surveillance standards, deficient treatment facilities, unsafisfactory chlorination practice, inadequate distribution system storage, inadequate cross connection control programs, inadequate operational records, inadequate water quality testing. Recommendations include: (1) immediate upgrading of bacteriological surveillance of public water systems; (2) increased and improved engineering surveillance of all public water supplies to at least minimum levels including periodic sanitary surveys of each system, complete routine chemical analysis of all supplies; (3) elimination of present sanction of seriously deficient water systems plus revitalization of certification program to obtain compliance with adequate standards; (4) use of legally enforceable compliance order procedures if necessary; (5) designation of County Health Departments to be responsible for surveillance of small public water systems; (6) implementation of provision of new flouridation legislation as soon as possible; (7) development and distribution of a single document incorporating program policy and design systems for public water systems. Expanded funding and program redirection and revitalization are essential for the program to attain full effectiveness and to meet its responsibilities. (Diefendorf-North Carolina) W75-03435

PACKAGED PUMPING STATIONS FOR SUB-URBAN WATER DISTRIBUTION,

J. B. Rishel. Water and Sewage Works, Vol 121, No 4, p 131-132, 134, April 30, 1974. 7 fig. Descriptors: *Pumping plants, *Water distribution, Water works, Evaluation, Equipment, Pumps, Storage tanks.

Packaged pumping stations are available in several types and their efficient application requires an evaluation of these pumping stations as well as the types of systems that are encountered in water distribution. The three specific styles of stations are the constant speed pumps without discharge pressure control valves, constant speed pumps with discharge pressure control valves, and the variable speed pumps. Suburban water systems are of two general types with storage tanks or without storage tanks closed systems. One of the most important factors for any distribution system to be evaluated is the friction loss in the piping of the water distribution system. The basic types of distribution systems with typical system head curves are described. The packaged pumping station selected is dependent upon the size of the system, the topography of the system, and the quality of electrical power available. Also included is a descrip-tion of four different water distribution systems. (Sandoski-FIRL) W75-03451

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.

Illinois Inst. for Environmental Quality, Chicago. For primary bibliographic entry see Field 5C. W75-03484

ALUM RECOVERY FROM WATER AND WASTEWATER TREATMENT PLANT SLUDGES.

Virginia Polytechnic Inst. and State Univ., Blacksburg. For primary bibliographic entry see Field 5D. W75-03542

THE SEWAGE SYSTEM OF THE CITY OF RANGOON,
For primary bibliographic entry see Field 5D.

NOVEL METHODS OF FRESHWATER PREPARATION AND WASTE WATER PURIFICATION IN PULP AND PAPER MILLS (NEUERE METHODEN ZUR FRISCHWASSERAUFBEREITUNG UND ABWASSER-FRINIGUNG IN ZELLSTOFF- UND PAPIERFAKRIKEN),

For primary bibliographic entry see Field 5D. W75-03602

CHRONIC FLUORIDE INTOXICATION FROM DRINKING WATER: PRELIMINARY REPORT, For primary bibliographic entry see Field 5C. W75-03695

5G. Water Quality Control

GUIDELINES FOR LAND DISPOSAL OF FEEDLOT LAGOON WATER.

Kansas State Univ., Manhattan. Cooperative Extension Service.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 591, \$3.25 in paper copy, \$2.25 in microfiche. 1973. 7 p, 9 fig, 7 tab, 1 ref. OWRT A-046-KAN(2). 14-31-0001-3516.

Descriptors: *Waste water disposal, *Feed lots, *Salinity, Irrigation water, *Kansas, Nutrients, Nitrogen, Phosphorus, Salts, *Water quality standards.

Guidelines are provided for feedlot operators who dispose of lagoon water on agricultural lands. The design of lagoon, pumps, and irrigation systems

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are not discussed. Because lagoon water contains such plant nutrients as nitrogen, phosphorus, and potassium, its application on agricultural land, in correct amounts, can increase crop yields. How-ever, because it also contains salts of sodium, calcium, and magnesium, too much lagoon water can pollute the soil. The salt accumulation from lagoon water is most likely to occur in dry areas wh precipitation is not adequate to leach the salts downward below the root zone. Guidelines on how to dispose of such lagoon water to minimize the chance of reducing the land's productivity are given. The guidelines are based on present irrigation-water-quality standards and on data collected from various feedlots in Kansas. (Powers-Kansas W75-03306

POLLUTIONAL ASPECTS AND CROP YIELDS RESULTING FROM HIGH MANURE APPLICA-TIONS ON SOIL, Nebraska Univ., Lincoln. Dept. of Agricultural

Engineering.
For primary bibliographic entry see Field 5B.
W75-03310

MOBILITY AND DEACTIVATION OF HERBI-CIDES IN SOIL-WATER SYSTEMS, Nebraska Univ., Lincoln. Water Resources Research Inst. For primary bibliographic entry see Field 5B.

ON TAXATION AS A POLLUTION CONTROL

POLICY, Pittsburgh Univ., Pa. Graduate School of Busi-

R. F. Byrne, and M. H. Spiro. Swedish Journal of Economics, No 1, p 105-109, 1973. 1 fig, 7 ref. OWRT A-028-PA(2).

Descriptors: *Pollution taxes(Charges). *Economic efficiency, *Pollution abatement, *Water policy, Water pollution control, *Taxes, Model studies, *Mathematical models.

A generally held proposition is that the imposition of taxes to combat pollution is at least as efficient as the imposition of standards. Several authors have argued that taxation may not lead to an efficient outcome. This paper demonstrates that taxation may not be efficient under circumstances when the firm has at its disposal a number of production processes of the fixed proportion, constant return to scale variety. The discussion proceeds in three stages: (1) a geometrical example is presented; (2) a mathematical model is demonstrated and (2) discussions the selection of the selection. strated; and (3) a discussion of the relevance of conclusions is made. The situation posed above is not uncommon. It is typical of situations faced by firms in steel, phosphate production, pulp and paper, and petroleum industries, where a number of alternative processes are technologically feasible and the selection of a particular process or combination of processes in a plant is an economic choice. Another factor reinforcing the ap-propriateness of the model are existing accounting practices which have treated unit costs as constant over substantial ranges whether or not such costs are constant in actuality. (Schroeder-Wisconsin) W75-03329

HOW DO YOU EXPLAIN THE COST, LFE Control System Industries, Santa Clara, For primary bibliographic entry see Field 6C.

PURIFIED WASTEWATER-THE UNTAPPED PURIFIED WASTEWALLES THE WATER RESOURCE, Envirotech Corp., Menlo Park, Calif. For primary bibliographic entry see Field 5D.

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS. Texas Univ., Austin. Dept. of Chemical Engineer-

For primary bibliographic entry see Field 6D.

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS, Delaware Univ., Newark. Academy of Natural

Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region. For primary bibliographic entry see Field 6G. W75-03352

ENVIRONMENTAL POLLUTION IN RAPIDLY GROWING ECONOMY, For primary bibliographic entry see Field 6G.

DISTRIBUTIONAL IMPACTS OF ENVIRON-MENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL, New York State Coll. of Agriculture and Life

Sciences, Ithaca. Dept. of Agricultural **Economics**

R. J. Kalter, and L. E. Gosse. Water Resources Bulletin, Vol 10, No 13, p 498-511, 1 fig, 6 tab, 14 ref.

Descriptors: *Government finance, Government supports, Pollution abatement, *Economic impacts, Equity, Distribution, *Water pollution control, *Management.

Identifiers: Water Pollution Control Acts. HUD Acts, Farmers Home Administration Act, Public Works and Economic Development Act, Appalachian Regional Development Act.

The distributional impacts of five federal water pollution grant programs on 50 states and the District of Columbia during the years 1957-71 are assessed. The grant programs include the EPA's Water Pollution Control Acts; the HUD Acts; the Farmers Home Administration Act; the Public Works and Economic Development Act (EDA); and the Appalachian Regional Development Act. Expenditures under each program during the period were \$3,525.96, \$368.70, \$87.90, \$263.74, and \$41.57 million respectively. Two procedures to measure the equity impact are utilized. The first utilizes a net transfer approach. Expenditures for each of the federal programs under the approach are treated as gross transfer payments and are netted against tax burdens imposed to support these programs. Results suggest that substantial differences exist in both total and per capita grants and average personal income by state appears weak. Only a weak geographic pattern exists for states favored by the overall program. Applying least-squares regression to per capita tax contribution for all grant program's impact on per capita personal income indicates no significant relationship exists. The second equity approach presented hypothesizes assumptions about potential returns from the grants and then tests the sensitivity of the equity impact to program effectiveness. (Schroeder-Wisconsin) W75-03354

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT, McBurney, Musolf and Whipple, Madison, Wis. For primary bibliographic entry see Field 6E.

ENVIRONMENTAL LAW-OIL POLLUTION CONTROL-IN THE ABSENCE OF FEDERAL PREEMPTION AND ANY FATAL CONFLICT BETWEEN STATUTORY SCHEMES, A STATE MAY CONSTITUTIONALLY EXERCISE ITS POLICE POWER TO PROVIDE FOR CLEANUP OF OIL SPILLAGE AND FOR RECOUPEMENT OF COSTS CONCURRENTLY WITH THE FEDERAL GOVERNMENT,

Georgia Journal of International and Comparative Law, Vol 4, p 216-224, 1974. 67 ref.

Descriptors: *Florida, *Judicial decisions, *Oil pollution, *Legislation, *Federal government, Governmental interrelations, State jurisdiction, Federal jurisdiction, Water pollution sources, Oil spills, Oil industry, Oil, Cost allocation, Costs, Economic impact, Government finance, Water pollution, Oceans, Environmental effects, Adop-tion of practices, Water Pollution Control Act, Water quality control. Identifiers: Coastal waters, Injunctive relief, State

The relationship between state and federal regulation in the admiralty area has been a source of contotin the administration and the source of control fusion in the development of maritime law. In Askew v. American Waterways Operators, Inc., plaintiff-appellee, operators of oil terminal facilities, brought an action against the State of Florida to enjoin application of the Florida Oil Spill Prevention and Pollution Control Act. They challenged it on the grounds that the provisions for un-limited liability conflicted with the Federal Water Quality Improvement Act of 1970 and the Limitation of Liability Act. Defendant-appellant main-tained that the Federal Act encouraged state regulation and cooperation. The United States Supreme Court held that the Florida Act does not invade a regulatory situation pre-empted by the Federal Act. The end result, hopefully, will be to strengthen the state's power to protect its environ-ment by enacting stringent pollution control laws. and to allow the state power to be concurrent with the federal government. The unlimited liability provision of the Florida Act will probably be upheld because cleanup costs to the state separate expense not covered by the Federal Act. (Dillingham-Florida) W75-03365

CHECKING UP ON FIRMS' SPILL-PREVENTION, CLEANUP PLANS.
The Oil and Gas Journal, Vol 72, No 30, p 117, July 29, 1974.

Descriptors: *Oil spills, *Water pollution control, *Federal government, Water policy, *Pollution abatement, Water quality control, Regulation, Water quality standards.

Spot checks are being taken of possibly hazardous oil facilities by government agents, in areas of navigable waters or their tributaries which have a pollution prevention program. Such programs, cer-tified by registered professional engineers, were to have been completed by July 10, 1974. These plans are not required to be filed with the EPA. Oil companies are requested to build dikes around storage pames are requested to build dikes around storage tanks or use any other steps for containment of oil spills. If spills should occur, the EPA would probably dictate the terms of the prevention plan required under the regulations. (Leibowitz-FIRL) W75-03373

WILLINGNESS TO PAY FOR POLLUTION ABATEMENT: A CASE STUDY, Guelph Univ. (Ontario). D. A. L. Auld.

Alternatives, p 34-36, Winter 1974. 1 tab.

Descriptors: *Pollution abatement, Regression analysis, Social aspects, Economic impact, Social values, *Canada, Lake Ontario, Pollution taxes(Charges), *Attitudes. Personal interviews were conducted in two Canadian cities, Hamilton and Guelph, to assess information on: (a) willingness-to-pay for pollution abatement in general; (b) payments for specified degrees of abatement; and (c) the relationship between willingness-to-pay and socio-economic factors such as income, age, education, and location. Hamilton, an industrial city of 300,000 located on Lake Ontario, specializing in steel, is subject to considerable air and water pollution.
Guelph, a city of 60,000, is in an agricultural
setting and experiences little pollution. A total of
306 and 100 householders were interviewed for each city, respectively. Results indicate that 26 and 22 percent of the respondents from Hamilton and Guelph were not willing to pay for pollution abatement, with no significant relationship found between this variable and income, age, education, or location. With respect to willingness-to-pay, an inverse relationship was discovered between age and amount willing to pay. Some relationship between willingness-to-pay and income was also discovered although it was less than proportional No relationship between willingness-to-pay and proximity to pollution sources was found. (Schroeder-Wisconsin) W75-03389

AQUATIC WEED HARVESTING COSTS AND

EQUIPMENT-1972, Aquamarine Corp., Waukesha, Wis. For primary bibliographic entry see Field 4A. W75-03391

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES,

Mote Marine Lab., Sarasota, Fla. E. J. Habas, and C. K. Gilbert. Environmental Letters, Vol 6, No 2, p 139-147, 1974. 2 tab. 7 ref.

Descriptors: *Red tide, *Economic impact, Water pollution sources, *Gymnodinium, *Florida, Economics, Tourism, *Damages, Environmental effects Costs Identifiers: Gymnodinium breve.

In the summer of 1971 the red tide devastated the west coast of Florida, creating environmental and economic chaos. The economic impact is summarized. Data collection to determine the economic impact was made difficult due to three factors: (1) the actual duration of the red tide is difficult to delineate; (2) the economy of the seven affected coastline counties was generally subor-dinate to the remaining unaffected sectors of the counties; and (3) 1971 was a year of substantial growth for all seven counties. Data was first sought through questionnaires to the Chambers of Commerce in affected areas, but poor responses limited its usefulness. Personal interviews with proprietors of gulf resorts and other business, local newspaper accounts, and extrapolation of Florida's Department of Commerce and Business publications were also used. Results indicate that the Red Tide caused nearly \$20 million in damage, including: \$6 million, hotels/motel revenues; \$2.5 million, restaurants; \$2.2 million, amusement; and \$3.8 million, other business revenue. A number of economic factors including loss of worker income and fishing revenue were not included in the tabu-lation. A future Red Tide of equal severity could cause up to 40% more economic damage. (Schroeder-Wisconsin) W75-03393

THE IMPACT OF WATER RESOURCE QUALITY CHANGES ON SURROUNDING PROPERTY VALUES.

Dornbusch, David M. and Co., Inc., San Francisco, Calif.

S. M. Barrager. Water Resources Bulletin, Vol 10, No 4, p 759-765, 1974. 2 ref.

Descriptors: *Water pollution control, *Pollution abatement, *Property values, Economic impact, Benefits, *Regression analysis, *Oregon, Water

Identifiers: Neighborhood amenities, Nuisances, Willamette River(Ore), Clackamas County(Ore).

Multiple regression techniques are utilized to measure the impact of pollution abatement efforts on property values of proximate single-family re-sidences along Oregon's Willamette River. The sidences along Oregon's Willamette River. The study areas, Oak Grove and Jennings Creek, located in an unincorporated portion of Clackamas County, are dominated by single-family houses over 15 years old and having an average value of \$26,000. Water quality in the river has improved dramatically over the 1960 to 1970 period. To determine the change in property values over the same period in the study area, tax assessment value data were collected as a partial proxy for the years surrounding 1960 and 1970. Sales price data were also collected. Property value changes for the period were calculated by adding the capitalized value of property tax changes to the estimated change in sales or market value. Results of the regression model indicate that changes in property values attributable to water quality improvements were substantial and statistically significant. Ap-plicability of the regression model to the responses of property values to other stationary neighborhood amenities or nuisances, including highways, airport, parks or commercial parks, is also discussed. (Schroeder-Wisconsin) W75-03395

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES,

Gilbert Associates, Inc., Reading, Pa. L. E. Ritter, and P. A. Podolick. Public Works, Vol 104, No 7, p 84-88, 1973. 2 fig, 4

Descriptors: *Industrial wastes, *Pollution taxes(Charges), Economic efficiency, Planning, Industries, Effluents, Waste water treatment, Water pollution control, *Costs, Sewage treat-ment, Cities. Identifiers: *Surcharges(Pollution control).

Development of a surcharge formula to equitably tax firms producing strong wastes is shown for one eastern U.S. city. Previously, the city operated on a permit system which limited industrial waste output to minimum levels set by ordinance. The per-mit method was unsatisfactory because of the difficulty of enforcement and potential inefficiencies resulting from pre-treatment requirements. The development of a surcharge formula began with a series of surveys of field inspection of city facili-ties; personal interviews with representatives of each company identified as potential producers of extra-strength waste; and actual field sampling at each company. Based on this, 24 firms were designated to be surcharged. The list included each industry discharging wastes exceeding the BOD, suspended solids and/or dissolved solids concentrations of domestic sewage specified by or-dinance. From the sampling results, average concentration of the above were determined by industry. The basic approach to determine the surcharge is to determine the actual cost of treatment on a unit cost basis/waste parameter, and apply unit costs for treatment of industrial waste discharges to the portion of the waste load in excess of nor-mal domestic waste. (Schroeder-Wisconsin) W75-03397

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION, Oak Ridge National Lab., Tenn.

For primary bibliographic entry see Field 6D.

EVACUATION RISKS - AN EVALUATION, National Environmental Research Center, Las

For primary bibliographic entry see Field 6G. W75-03424

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-FIFTH ANNUAL REPORT, YEAR ENDED 30TH JUNE

Metropolitan Water Sewage and Drainage Board, Sydney (Australia). (1973). 55 p, 3 fig, 12 tab, photos, 12 append.

Descriptors: *Sewerage, *Drainage systems, *Australia, *Water distribution, Reservoirs, *Water supply, Water conservation, Pumping plants, Expenditures, Budgeting, Construction, Stormwater, Storage capacity, Tunnel construc-

Identifiers: *Retriculation, *Sydney(Aust), *Stormwater drainage, Stormwater channels, South Coast area, Shoalhaven Scheme, Ocean outfall systems.

The Metropolitan Water Sewerage and Drainage Board, established by law in 1924, is responsible for conservation, preservation, and distribution of water; for the provision of sewerage facilities; and for construction, control and maintenance of certain stormwater channels in an area of some 4,000 square miles, including metropolitan Sydney, a number of outlying cities, and the South Coast areas. Water supply system consists of 6 major and 4 minor storage reservoirs, 191 service reservoirs, 116 pumping stations and 9422 miles of watermains (246 miles of new mains in 1972-3). There are 194 miles of channels in the stormwater drainage network and 7774 miles of sewers in the 19 separate sewer systems. On June 30, 1973, the Board was supplying water to an estimated 3,063,000 people, while sewerage facilities were available to an estimated 2,600,000 people. Total revenue for the year was \$136,591,820 and expenditure was \$136,582,093. The Board is currently engaged in a ten-year (1971-81) program to insure sufficient water storage and water and sewerage services to meet the foreseeable requirements of its area. Work on Shoalhaven Scheme to bring water from Nepean Reservoir to the South Coast by constructing a diversion tunnel is virtually completed. Other Shoalhaven contracts for earthwork dams, pumping stations and hydraulic gates, relocation of roads and railroads are progressing on schedule. Total cost of project is estimated at \$104 million with Board's share approximately \$86 million. (Diefendorf-North W75-03432

METROPOLITAN WATER SEWERAGE AND DRAINAGE BOARD, SYDNEY, EIGHTY-SECOND ANNUAL REPORT YEAR ENDED JUNE 1970.

Metropolitan Water, Sewage and Drainage Board, Sydney (Australia). (1970). 67 p, 3 fig, 14 tab, photos, 14 append.

Descriptors: *Water distribution, *Water storage, *Sewage treatment, *Drainage systems, *Water supply, *Budgeting, Australia, Reservoirs, Pump-ing plants, Expenditures, Construction, Engineering structures.

Identifiers: *Sydney(Aust), Stormwater channels,

South Coast area, Sewerage reticulation.

The Metropolitan Water Sewerage and Drainage Board's activities during 1969-70 and important works currently being undertaken plus a description of various water supply, sewerage and drainage systems under its jurisdiction are discussed. Established in 1924, the Board is equipped with all the resources for investigation, design, construction, and operation of large en-gineering projects. Water storage, water distribution, sewerage reticulation and sewage treatment are major activities. Water supply system has 6 major and 4 minor storage reservoirs, 183 service reservoirs, 112 pumping stations and 8805 miles of

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watermains with 270 miles of watermains being added during 1969-70. Shoalhaven Project, involv ing construction of a tunnel between Nepean and Avon Dams to divert water from Nepean Reservoir to the South Coast plus building of power plants and pumping stations, is in the design work stage. There are 6804 miles of sewers and 190 miles of channels in the stormwater drainage network. Water was being supplied to an estimated 2,968,000 people, while sewerage facilities were available to an estimated 2,374,000 people. Total revenue for the year was \$88,343,448 and expenditure from revenue was \$88,328,341. Progressive augmentation of water storage and major supply system to insure that adequate quantities are available to meet increasing consumer demand is top priority planning item. (Diefendorf-North Carolina) W75-03433

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.

Environmental Protection Agency, Atlanta, Ga. For primary bibliographic entry see Field 5F. W75-03435

ENERGY EVALUATION OF WATER MANAGE-MENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA.

Environmental Protection Agency, Gainesville, For primary bibliographic entry see Field 6A.

W75-03436

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POL-LUTION AND TRANSFER RELATIONSHIPS, Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships. For primary bibliographic entry see Field 5B. W75-03440

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY,
Academy of Natural Sciences of Philadelphia, Pa. For primary bibliographic entry see Field 6G.

METHOD AND APPARATUS FOR RECOVER-ING A SUBSTANCE FLOATING AS A SHEET ON THE SURFACE OF A LIQUID MASS, Societe Bertin et Cie, Paris (France). J. Mourlon, and E. M. R. Dubois.

Canadian Patent 948,120. Issued May 28, 1974. Patent Office Record, Vol 102, No 22, p 22-48,

Descriptors: *Floating, *Patents, *Liquid wastes, *Separation techniques, Waste water treatment, Oil wastes, Water pollution control. Identifiers: *Recovery.

A process is described for recovering a substance, such as a hydrocarbon, spread as a thin sheet and floating on the surface of a liquid. The liquid is, in the vicinity of its surface, subjected to a local rotating movement so as to bring about the formation of a vortex-type cavity. The cavity is open and has a vertical axis: it accumulates the substance originating from the sheet; and from this cavity the accumulated substance is extracted. The amount extracted is automatically replaced, as it is being extracted, by further substance emanating from the sheet. (Prague-FIRL) W75-03449

A SURVEY OF INTERNATIONAL CUSTOMA-RY RULES OF ENVIRONMENTAL PROTEC-

Wadham Coll., Oxford (England). I. Brownlie.

Natural Resources Journal, Vol 13, No 2, p 179-189, April 1973. 32 ref.

Descriptors: *International law, *International waters, *Pollution abatement, *Legal aspects, *Environmental control, Water law, Controls, Standards, Regulation, Jurisdiction, Political aspects, Water rights, Water policy, Water quality control, Water politicin, Water resources development, Water resources development, Water management of the water resources development, water resources dev resources development, Water manage-ment(Applied), Adoption of practices, Adminis-

Identifiers: *International agreements

Customary law provides limited means of social engineering, and, therefore, there is a particular need for development of new institutions, stan-dards and local units to deal with the protection of the environment. Encompassed within the scope of customary or international law are three main concepts: state responsibility, territorial sovereignty of states, and, freedom of the seas. Although these three areas cover much of the critical environmental aspects of international concern, there are some areas where new solutions and practices must be fashioned to cope with the mounting problems. Solutions include forming special zones of jurisdiction as Canada has done in eir 1970 Arctic Waters Pollution Prevention Act. Unilateral self-help in emergency circumstances is another practical remedy, as illustrated by Britain's actions in dealing with the Torrey Canyon disaster. Probably the most useful and lasting proposal involves the formation of new standards in general international law, promul-gated, instituted and enforced on a multilateral basis by the United Nations. (Silber-Florida) W75-03453

PEOPLE V. OCEANA TERMINAL CORP. (PROSECUTION FOR AN OIL SPILL). For primary bibliographic entry see Field 6E. W75-03456

UNNATURAL SHORELINE, California State Univ., San Francisco. Dept. of

Environment, Vol 16, No 9, p 27-35, November 1974. 2 fig, 6 photo, 15 ref.

Descriptors: *California, *Bays, *Sedimentation, *Shoreline, *Drainage basins, *Planning, Construction, Adoption of practices, Regulation, Jurisdiction, Coastal areas, Water quality, State governments, Administrative agencies, Adminis-tration, Decision making, Conservation, United States, Natural resources, Development, Silting, Water resources development.

Identifiers: *Coastal zone management, Dredging.

Before the presence of man, San Francisco Bay was already being filled in by natural causes, receiving sediment from drainage basins. Along with sediment from gold mining, and effects of agriculture, salt pond construction, dredging, subsidence, fill and urbanization have greatly altered the bay system. As a result the bay is in danger of being filled in many thousands of years sooner than might otherwise be the case. The impact of man on the alteration of the bay shoreline has been grossly out of proportion to the few short years of his presence. Careful planning must now be undertaken to save the bay. The Bay Conservation and Development Commission, a permanent regulatory agency with jurisdiction over the bay and a hundred foot shoreline land around it, was created in 1965. In addition, the regional Water Quality Control Board, the State Department of Fish and Game, the United States Department of the Interior, and a number of citizen groups have an active interest in the future of the bay. (Sperling-Florida)

W75-03459

A. H. SMITH SAND AND GRAVEL CO. V. DEPT. OF WATER RESOURCES (ACTION DEALING WITH FILLING OPERATIONS IN FLOODPLAIN). For primary bibliographic entry see Field 6E. W75-03464

COMMONWEALTH V. BOROUGH OF GALETON (PETITION TO ENFORCE CLEAN STREAMS LAW). For primary bibliographic entry see Field 6E.

IN RE BARKER SARGENT CORP (APPEAL FROM ENVIRONMENTAL BOARD DECISION). For primary bibliographic entry see Field 6E. W75-03466

COMMONWEALTH V. WASHINGTON TOWNSHIP (ACTION TO ORDER COM-PLIANCE WITH CLEAN STREAMS LAW). For primary bibliographic entry see Field 6E.

ROBERT E. NILLES, INC. V. ILLINOIS POLLU-TION CONTROL BD. (ACTION AGAINST POL-LUTION CONTROL BOARD FOR DENIAL OF SEWERAGE PERMITS). For primary bibliographic entry see Field 6E. W75-03474

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY.
23 U.S.T. 201, T.LA.S. NO 7312, p 302-369, April 15. 1972.

Descriptors: *International Boundary and Water Comm., *International waters, *International commissions, *International Joint Commission, Water quality control, Federal government, Water quality, Ships, Pollution, Water pollution, Sewage disposal, Waste control, Industrial wastes, Great Lakes, Great Lakes region, Lakes, Navigable waters, Administrative agencies, Adoption of practices, Environmental effects. Identifiers: Administrative regulations, International agreements.

Pursuant to the Boundary Waters Treaty of 1909 Canada and the United States, concerned about the grave deterioration of water quality in the Great Lakes and St. Lawrence River, agreed in 1972 to a series of measures to be implemented by December 31, 1975. In order to control pollution from municipal sources, sewage treatment facili-ties will be constructed. Control of industrial waste discharge and elimination of discharge of toxic metals, organic contaminants and radioactive materials will be regulated and enforced. Shipping operations will be regulated to cut down on Great Lakes water pollution. Vessel design, construction, waste discharge and operations are to be subject to the principles of the agreement. The International Joint Commission will assist in the agreement's implementation establishing a Great Lakes Water Quality Control Board. The agreement is to remain in force at least for five years and will continue until terminated upon twelve months notice given by either party to the other. (Dillingham-Florida) W75-03480

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING. Rivkin/Carson, Inc., Washington, D.C. For primary bibliographic entry see Field 6E.

WATER QUALITY MANAGEMENT AND PROTECTION—Field 5

Water Quality Control—Group 5G

TRANSLATIONS ON ENVIRONMENTAL. QUALITY, NO. 7.
Joint Publications Research Service, Arlington,

Va. For primary bibliographic entry see Field 6E. W75-03486

A PROGRAM FOR THE FUTURE-WATER AND SEWER IN RURAL AMERICA. Commission on Rural Water, Washington, D.C. For primary bibliographic entry see Field 5D. W75-03488

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE, Florida Univ., Gainesville. Coll. of Law For primary bibliographic entry see Field 4B. W75-03489

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION, Department of State, Washington, D.C. For primary bibliographic entry see Field 6G. W75-03490

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PRO-GRAM-PROPOSED WATE MANAGEMENT GUIDELINES. WATER

Soil Conservation Service, Washington, D.C. Federal Register, Vol 38, No 86, p 11094-11095, May 4, 1973.

Descriptors: *Water quality, *Water resources development, *Construction, *Adoption of practices, *Water management(Applied), Water conservation, Water distribution(Applied), Water resources, Watershed management, Water supply, Water Street Presistance of the present of the p Water storage, Environmental sanitation, Irriga-tion programs, Project planning, Legal aspects, Drainage systems, Permits, Coordination, Stream-flow, Administration.

Identifiers: Administrative regulations.

Water quality management measures have been authorized for implementation in watershed and resource conservation and development projects pursuant to the Rural Development Act of 1972. Criteria for such assistance includes sponsorship by units of government or non-profit organizations having legal authority and financed ability to plan, install, operate, and maintain the measure. When planned in a watershed project, works of improve-ment must be an integral part of a project provid-ing substantial benefits for flood prevention, irrigation, or drainage. Sponsors must show that all necessary land and water rights have been or can be obtained. All necessary permits must also be obtained. Works of improvement include measures for the enhancement of water quality to improve the environment. They include the storage of water or other facilities to augment, divert, retain, or regulate streamflow. The Soil Conserva-Protection Agency and the state agency responsi-ble for pollution control to determine flow require-ments. (Sperling-Florida) W75-03491

DISTRIBUTION OF POTENTIAL MOSQUITO VECTORS IN THE IMPERIAL VALLEY, CALIFORNIA, 1971-1972, Walter Reed Army Inst. of Research, Washington,

D.C. Dept. of Entomology. J. W. Leduc.

Mosq News, Vol 33, No 4, p 594-599, 1973, Illus. Mosq News, voi 35, No4, p. 594-599, 1973, India, ldentifiers: Anopheles-franciscanus, Arbovirus, *California, Culex-terythrothorax, Culex-tarsalis, Culiseta-inornata, *Distribution patterns, Encephalitis, Flavivirus, *Imperial Valley(Calif), Mosquito vectors, St-Louis, Virus. Adult mosquito populations were monitored at 5 localities in the Imperial Valley, California, from Nov., 1971 to Oct., 1972. Culex tarsalis and Culiseta inornata were widely distributed in the areas while Culex erythrothorax and Anopheles franciscanus were limited to permanent pond habitats. SLE (Saint Louis encephalitis) virus was isolated from pools of C. tarsalis and C. erythrothorax in Aug., 1971. C. erythrothorax may be an important vector of arboviruses in the permanent pond habitat, while C. tarsalis is the most widely distributed vector.—Copyright 1974, Biological Abstracts, Inc.

A DEVICE FOR MAINTAINING CONSTANT OXYGEN CONCENTRATION IN FLOWING

Colorado Div. of Wildlife, Fort Collins. J. O. Cochran, and W. H. Babcock.

The Progressive Fish-Culturist, Vol 36, No 3, p 177-178, July 1974. 1 fig, 1 ref.

Descriptors: *Dissolved oxygen, Equipment, Technology, *Design, Methodology, Oxygena-tion, Aeration, Laboratory tests, Brook trout.

A system for maintaining dissolved oxygen concentrations for low temperature oxygen trials on brook trout is described. Different concentrations of dissolved oxygen may be delivered simultaneously at independently variable flow rates. Dissolved oxygen levels obtainable in test operations were from 0.4 mg/liter to 9.0 mg/liter with a variation of plus or minus 0.2 mg/liter in a single chamber. Reoxygenation of water was achieved by mixing deoxygenated water with water containing 9.0 mg/liter to desired dissolved oxygen levels. (Katz) W75-03522

A STUDY: EFFECTS OF GEOLOGY AND NUTRIENTS ON WATER QUALITY DEVELOP-

Texas Univ. at Houston. Dept. of Civil Engineering. L. J. Stone.

Journal of the American Water Works Association, Vol 66, No 8, p 489-494, August, 1974. 15 fig, 1 tab, 25 ref.

Descriptors: *Watersheds(Basins), Hydrology, Water quality control, Environmental effects, Alkalinity, *Geology, Populations, Streamflow, Water resources, Management, *Nutrients. Identifiers: Nutrient loading.

Two watersheds in northwest Arkansas were studied for geology and land use in order to relate stream-water-quality development to the environmental factors present in the ecosystem. Relationships established were water quality-geology and water quality-nutrient loading. Analysis included pH, alkalinity, calcium hardness, and electrical conductance of the geological formations. The areas of study contained low population density of both humans and animals. It was projected that any increase in either population will markedly increase the nutrient loadings in stream flow. Data are to be used for future basin management and water quality control. (Prague-FIRL) W75-03539

A SLUDGE CAKE INCINERATION PROCESS AND AIR POLLUTION CONTROL SYSTEM, Environmental Protection Agency, Chicago, Ill. Surveillance and Analysis Div. For primary bibliographic entry see Field 5D.

SEWER PIPE: INFILTRATION IS THE ISSUE, For primary bibliographic entry see Field 5D. W75-03548

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW), National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div. For primary bibliographic entry see Field 5D. W75-03553

COMBINATION LIMESTONE-LIME TREAT-MENT OF ACID MINE DRAINAGE, Environmental Protection Agency, Norton, W. Va. Norton Mine Drainage Field Site.
For primary bibliographic entry see Field 5D. W75-03559

AEROBIC BIOLOGICAL STABILIZATION OF SANITARY LANDFILL LEACHATE, Kentucky Univ., Lexington. Dept. of Civil Engineering. For primary bibliographic entry see Field 5D. W75-03564

THE ROLE OF THE CHEMICAL INDUSTRY IN THE FIGHT AGAINST WATER POLLUTION IN THE PAPER INDUSTRY (ROLE DE L'INDUSTRIE CHIMIQUE DANS LA LUTTE CONTRE LA POLLUTION DES EAUX EN PAPETERIE),

Badische Anilin- und Soda-Fabrik A.G., Ludwigshafen am Rhein (Germany).

A. Bachtik.

Revue ATIP (Association Technique de l'Industrie Papetiere), Vol 28, No 4, p 189-195, 1974. 4 fig, 3 ref.

Descriptors: Water pollution sources, *Water pollution control, "Chemicals, "Pollution abatement, "Pulp wastes, "Additives, Industrial wastes, Pulp and paper industry, Waste water(Pollution), Biochemical oxygen demand, Suspended solids, Effluents, Waste water treatment.

Identifiers: Retention aids(Papermaking), White water(Paper machine effluent), Sizing(Paper).

Contributions of chemical suppliers to the abatement of water pollution by pulp and paper mills are discussed, notably the function of fiber and filler paper machine white waters, as well as the use of surface sizing in lieu of engine (beater) sizing agents for lowering the BOD of effluent discharges. (Speckhard-IPC) retention aids for reducing suspended solids in

WATER: ITS QUALITY OFTEN DEPENDS ON THE FORESTER,
Food and Agriculture Organization of the United

Nations, Rome (Italy). For primary bibliographic entry see Field 5B. W75-03589

AIR AND WATER POLLUTION CONTROL IN CRUDE TALL OIL MANUFACTURE IN THE PULP AND PAPER INDUSTRY,

Rust Engineering Co., Birmingham, Ala. For primary bibliographic entry see Field 5D. W75-03598

ECOLOGY AND THE PROBLEM OF REHA-BILITATING WASTES FROM MINERAL EX-TRACTION.

London Univ. (England). Dept. of Applied Biolo-

gy. G. T. Goodman.

Proceedings of the Royal Society, Series A., Vol 339, No 1618, p 373-387, August 13, 1974. 1 tab, 15

*Soil-water-plant relationships, Descriptors: *Mineral industry, *Environmental effects, *Vegetation regrowth, Metals, Plant breeding, Grasses, Resistance, Industrial wastes, *Mining, Ecology. Identifiers: United Kingdom.

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G—Water Quality Control

The problems associated with mineral extraction and possible solutions to them in the United King-dom are discussed. Problems include aesthetics, nuisance, health hazards and safety. The reclama-tion process of revegetation can take the following forms: plant highly tolerant vegetation, improve forms: plant highly tolerant vegetation, improve the soil at poor sites, or pre-plan excavation procedures to dump or bury harmful wastes deeply. Common spoil materials are listed with characteristics of inhibitors to revegetation. Slip-page of material down a hillside, spontaneous combustion of smelter wastes, slopes too steep to work with machinery, fluctuating water supply, soil which has been compacted, temperature extremes from dark colored wastes, wind turbulence, deficiency of nutrients, stony ground, broken, uneven surfaces, erosion and absence of soil organisms are factors delaying or eliminating revegetation. The inhibitory effects of toxic materials are discussed in more detail. Toxic metals can be dealt with by pH adjustment, complexation with organic matter, or planning geneti-cally metal-tolerant populations of common grasses. (Pulliam-Vanderbilt) grasses. (Pu W75-03626

GUIDELINES FOR DEVELOPMENT OF CRITERIA FOR CONTROL OF OCEAN WASTE DISPOSAL.

Interstate Electronics Corp., Anaheim, Calif. For primary bibliographic entry see Field 5E. W75-03632

GREAT LAKES WATER QUALITY, 1973 AN-NUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

International Joint Commission-United States and

Canada. Great Lakes Water Quality Board. Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as PB-233 187, \$5.25 in paper copy, \$2.25 in microfiche. Report No IJC/DOS-7401, April 1974. 115 p, 4 fig, 15 tab, 3 append.

Descriptors: *Water quality, *Great Lakes, *International Joint Commission, *United States, *Canada, *Programs, Evaluation, Lake Superior, Lake Michigan, Lake Huron, Lake Erie, Lake Ontario, Monitoring, Eutrophication, Water pollution

Identifiers: Lake St. Clair.

An assessment of the present water quality of the Great Lakes and their connecting channels was provided and the data collection and analysis programs available for this evaluation were critically examined. The status of remedial programs being implemented to achieve the objectives for water quality in the lakes as agreed to under the 1972 Canada-United States Agreement was reviewed Progress in reducing pollution from municipal waste discharges was highlighted. While significant progress is being made, particularly with re-gard to reducing phosphorus inputs to control eutrophication, several major sewage treatment facilities will not be completed by 1975. (Humphreys-ISWS) W75-03640

EFFLUENT NEIGHBORS: THE MEXICO-UNITED STATES WATER QUALITY DILEM-

MA. California Western International Law Journal, Vol 3, p 152-172, 1972. 114 ref.

Descriptors: States,
*Riparian *Mexico. Descriptors: "United States, "Mexico, "International law, "Riparian rights, "International waters, Water pollution, Water pollution sources, Water pollution control, Water quality, Water quality control, Legal aspects, Water law, Water rights, Legislation, Treaties, Reasonable use, Relative rights, Water utilization, Rivers, Drainage systems, Colorado River, Rio Grande River, Adoption of practices, Administration, Indicial decisions. tion. Judicial decisions.

When a river becomes polluted, the contamination is not hindered by political demarcation but destroys the quality of the entire river to the detriment of all riparians and users of the water. The United States and Mexico share three international drainage basins, the Rio Grande, Colorado, and Tijuana river systems. The pollution regulated by international law is generally that which is the result of an injurious use. Traditionally, the rights of co-riparians to use an international stream included the right to pollute provided that the pollut-ing use would not harm a co-riparian or his use of the waters. The weight of authority considers 'equitable utilization' the predominant use doctrine with respect to both contiguous and successive international rivers. But it is unclear whether it is more effective to apply this principle on the administrative or the adjudicative level. The above concepts can be used to analyze water quality provisions of national and international laws of both Mexico and the United States. (Ritchie-W75-03677

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS, S. R. Schell.

Environmental Law, p 83-103, Vol 2, No 1, Winter, 1971, 71 ref.

Descriptors: *Estuaries, *Oregon, *Legislation, *Administrative agencies, *Water quality control, Estuarine environment, Navigable waters, Coastal areas, State governments, Federal government, Fisheries, Wildlife, Conservation, Natural resources, Water resources development, Recreation, Industrial wastes, Sewage discharge, Pollutants, Channelization, Submerged lands, Water policy, Water utilization, Water management policy. Water utilization. Water management.

Problems of estuaries in Oregon are discussed. Oregon's estuaries land is composed of 56,000 acres out of a total land area of 61.6 million acres, yet over 1,000 acres of this non-renewable resource have been filled in the last ten years. Oregon's commercial fishing industry is totally arine dependent. Each estuary in Oregon has a estuarine dependent. Each estuary in Oregon has a different salt-water/fresh-water mix, nurturing various plant and animal species. Conflicting use requirements compound the estuarine problems. Navigation demands channelization, dredging and Navigation terminals straintenancy, in the filling, as well as waste disposal. Logging and industrial wastes contribute to the pollution problems. Landfill is the most immediate problem facing the estuary. The federal government regu-lates landfills of this nature through the permit system operated by the Army Corps of Engineers. State agencies supplement the federal action by regulating non-navigable waters and the control, management and disposition of submerged lands which comprise a great part of the estuarine en-vironment. The Fish Commission regulates and prevents pollution discharges which will adversely affect fishery development. Federal and state agencies also have the power to regulate and control water quality through the regulation of discharges of waste, sewage and pollution. (Silber-Florida) W75-03678

NEW LEGISLATION FOR WATER QUALITY. Resources, Vol 42, No 42, p 2-4, January 1973.

Descriptors: *Legislation, *Water quality, *Water Descriptors: "Legislation, "water quality, "water pollution control, "Water quality control, "Water pollution, Permits, Legal aspects, Effluents, Water pollution sources, Wastes, Water policy, Water law, Penalties(Legal), Regulation, Federal government. Identifiers: Federal Water Pollution Control Act

Amendments of 1972. The effect of recent legislation on federal water pollution control programs is discussed. The Federal Water Pollution Control Act Amendments

of 1972 broaden the scope of the federal program.

The amendments represent a shift from effluent standards keyed to ambient water quality stan-dards to direct imposition of effluent standards that are not connected with environmental condi-tions. Two national goals are set forth in the act: the elimination of the discharge of pollutants into the navigable water by 1985 and the attainment of an interim goal of water quality by 1983. An emphasis is placed on research, demonstration, and education projects. The act also provides for increased matching grants for construction of publicly owned waste treatment plants and increased use of the permit system. The act provides that permits can be issued by states whose criteria and procedures have received federal approval. (Gragg-Florida) W75-03679

OHIO V. WYANDOTTE CHEMICALS CORP., RESTATEMENT OF THE ORIGINAL JU-RISDICTION OF THE SUPREME COURT OF

THE UNITED STATES,
For primary bibliographic entry see Field 6E.
W75-03680

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX G--REGULATORY WORKS--REPORT TO THE INTERNATIONAL JOINT COMMISSION.

International Joint Commission--United States and Canada. Great Lakes Levels Board. For primary bibliographic entry see Field 4A W75-03682

DEPARTMENT OF ENVIRONMENTAL PRO-For primary bibliographic entry see Field 6E. W75-03683

A LOOK AT LEGISLATION DEFINING USES OF NATIONAL FOREST LANDS, PART TWO, For primary bibliographic entry see Field 6E. W75-03685

AGRICULTURE'S POLLUTION SOLUTION FOR LAKE APOPKA,
For primary bibliographic entry see Field 5C.
W75-03686

ENVIRONMENTALISTS ATTACK ADMINISTRATION, INDUSTRY PLANS TO WEAKEN NEPA AND SET BACK RECENT CLEAN AIR CAINE Wilderness Report, p 3, April 1974.

Descriptors: *Water pollution, *Pollution abatement, *Administrative decisions, *Water management, *Water law, Conservation, Clean Air Act, Administration, Organizations, Federal government, Regulation, State governments, Water quality, Environment, Environmental effects, Standards, Pollutants, Water pollution sources, Air pollution.

Identifiers: National Environmental Policy Act(NEPA), Energy crisis.

The Nixon Administration is proposing legislation that would extend the deadline for industry compliance with air quality standards and would permit the use of 'intermittent controls' by stationary The Wilderness Society, National Wildlife Federa-tion, National Audubon Society, Izaak Walton League and the American Forestry Association have mounted an attack against the efforts of the Administration to undermine the Clean Air Act and other environmental legislation. The groups maintain that profit margins are more than adequate to cover the costs of pollution abatement and although temporary variances were permissi-ble during the energy crisis, any long term vari-ances are unacceptable. The effect of variances

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would weaken the National Environmental Policy Act and the Clean Air Act. Russell Train, chair-man of the Environmental Protection Agency, and Russell Peterson of the Council on Environm Quality have both come out strongly against at-tempts to weaken the laws. Should Mr. Train and Mr. Peterson not be able to stiffle the proposals to weaken the laws, it will be the duty of Congress to take action. (Barnes-Florida) W75-03687

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE,
Maine State Planning Office, Augusta. Coastal

Planning Group. For primary bibliographic entry see Field 6E. W75-03689

WINNIPESAUKEE RIVER EASIN CONTROL. For primary bibliographic entry see Field 6E. W75-03690

WATER STRATEGY PAPER HIGHLIGHTS EPA POLICIES.

Pollution Control Guide, Vol 3, paragraph 19783, p 19357-19371, 1974. (Reprint of EPA Water Quality Strategy Paper by Russell Train, Administrator).

Descriptors: *Water pollution control, *Federal Water Pollution Control Act, *Legislation, *Administration, Water policy, Administrative agencies, Decision making, Adoption of practices, Standards, State governments, Local govern-ments, Oil spills, Oceans, Political aspects, Coordination, Fishing, Recreation, Water quality standards, Administrative decisions, Federal govern-

Identifiers: FWPCA Amendments of 1972, Ef-Hazardous fluent limitations. stances(Pollution).

The Environmental Protection Agency's policies in administering its water pollution control programs have been published in the Water Quality Strategy Paper. Issues addressed by the paper include the basis for effluent limitations, permits and compliance manifolds agreements active. and compliance, municipal construction, anti-degradation, non-point source pollution control, spills of oil and hazardous materials, and the pro-tection of ocean and ground water. The two laws tection of ocean and ground water. The two laws with which the strategy paper are concerned are the 1972 Amendments to the Federal Water Pollution Control Act and the Marine Protection, Research and Sanctuaries Act of 1972. The Pederal Water Pollution Control Act begins a ten year program which aims at the achievement throughout this country, by 1983, of waters in which we can swim and fish. The strategy paper also functions as an exposition of policies that may be implemented in the future. An important role is be implemented in the future. An important role is envisaged for the states in carrying out this legisla-tion not only because of the magnitude of pollution control efforts that are necessary, but also because of the special and localized nature of many problems. (Sperling-Florida) W75-03691

WATER PROGRAM POLICY ISSUES, (EPA POLICY DIRECTIVES).
Pollution Control Guide, Vol 1, paragraph 2413, p

2222-2227, 1973.

Descriptors: *Permits, *Adoption of practices, *Decision making, Administration, *Administrative agencies, *Water pollution control, *Water quality standards, Water law, Regulation, Waster quainty standards, water aw, seguintion, Waste water disposal, Water quality control, Environmental sanitation, Industrial waste, Monitoring, Federal government, Water policy. Identifiers: Effluent limitations, Administrative regulations.

There has been confusion over priorities for issuing permits. There are deep and unproductive

disputes between Water Quality Standards and best practicable technology as a basis for issuing permits. The law requires that all permits be issued by December 31, 1974. Permits are issued on a best practicable technology basis, or, if more stringent controls are needed to protect water quality on a water quality standard basis. Even if water quality standards are the basis for a permit, the permit will issue on a best practicable technology basis, anyway, if the water quality analysis cannot completed in time to meet the December 31, 1974 deadline. To do otherwise would be to put a permittee in violation of the law through an inability to complete the analysis. The priority is to work first on permits which already have, water quality standard based, load allocations or where best practicable technology based permits will definite-ly be written. (Sperling-Florida) W75-03692

EXPLANATORY STATEMENT: IMPLEMENTA-

TION OF NPDES, (EPA).
Pollution Control Guide, Vol 1, paragraph 2414, p 2227-2244, 1973.

Descriptors: *Permits, *Administrative agencies, *Adoption of practices, *Water law, Regulation, Government finance, Federal government, Water pollution control, Water policy, Planning, Water quality, Treatment facilities, Water treatment, Decision making, Administration, Water quality Decision making, Administration, water quality standards, Water quality, Abatement, State governments, Legislation.

Identifiers: *FWPCA Amendments of 1972, *Administrative regulations.

Information regarding the national permit system was released by the Environmental Protection Agency (EPA) to the public in an explanatory statement. Main features of the permit system are summarized, including the principal aspects of the statute, important regulations that have been promulgated or are being developed, and major policy directives. The background of the program is described and other factual information concerning the scope of the program and the manner of its implementation and operation is discussed. Since the issuing of the explanatory statement in this article, the EPA has adopted a policy to issue environmental explanations of major standards, regulations and guidelines established by the Ad-ministrator. The Federal Water Pollution Control Act Amendments of 1972 provide new enforcement tools for fighting pollution and increased federal grants for construction of waste treatment facilities. (Sperling-Florida) W75-03693

TRANSLATIONS ON **ENVIRONMENTAL** QUALITY NO. 8.

Joint Publications Research Service, Arlington, Va.

Available from National Technical Information Service, U.S. Dept of Commerce, Springfield, Va 22161 as JPRS-61111, \$4.25 in paper copy, \$2.25 in microfiche. January 31, 1974, 50 p.

Descriptors: *Environmental control, *Pollution, *Ecology, *Meteorology, Water quality, Water quality control, Water pollution, Air pollution, Pollution sources, Pollution abatement, Water pollution control, Environmental sanitation, Water supply, Wastes, Sewage, Sewage treatment, Governments, Water resources development, Water law, Environmental effects, Legislation. Identifiers: *Environmental policy.

Translations are presented from the world press of articles and press commentary on environmental pollution and its effects. Also discussed are pollupollution and its effects. Also discussed are pollution control technology, organizations and programs. The articles were written by authors from Eastern Europe, Latin America, the Near East and Africa, and the Soviet Union. With the development of the economy, forces of production and scientific technology, steps must be taken to preserve and enhance environmental quality. Engineering systems to aid in water and air pollu-tion abatement have been developed. Despite the international energy crisis and problems of infla-tion several nations have undertaken concerted efforts to fight the contamination of the atmosphere by industrial pollutants. Among these control mechanisms have been the introduction of dust collection equipment to control emissions in cement plants. (Proctor-Florida) W75-03696

OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK ON SEPTEMBER 26-29, 1972).

President's Water Pollution Control Advisory Board, Washington, D.C.

Available from National Technical Information Service, U.S. Dept of Commerce, Springfield, Va 22161 as PB-229 808, \$4.75 in paper copy, \$2.25 in microfiche. September 29, 1972. 71 p, 30 ref, 5 tab.

*Oceans, *Waste Descriptors: disposal, Descriptors: *Oceans, *Waste disposal,
*Planning, *Water pollution control, *Federal government, Evaluation, Water pollution sources, Water pollution effects, Water policy, Water law, Water quality standards, Coasts, Disposal, Sewage disposal, Comprehensive planning.

Identifiers: Coastal waters, Contiguous zone, Ef-fluent limitations, Territorial seas(Jurisdiction), Environmental policy, FWPCA Amendments of

The President's Water Pollution Control Advisory Board met on September 26-29, 1972, to discuss the problem of ocean dumping pollution and to explore alternatives to ocean disposal of wastes. This report contains the official account of this meeting, including information received by the Board from representatives of federal, state and local government and various experts in the field of ocean disposal. The following are the principal recommendations made by the Board: (1) the immediate enactment of the Marine Protection, Research and Sanctuaries Act and Federal Water Pollution Control Act Amendments of 1972; (2) the establishment of Federal Water Quality Standards for the waters of the contiguous zone: (3) the establishment of pretreatment standards for industrial wastes discharged into municipal sewage systems; (4) completion of an inventory of the ocean bottom and coastal waters of the United States and its territories; (5) land disposal of dredge spoil where possible; (6) immediate action to curb the disposal of raw sewage into the ocean; (7) establishment of regional systems for the regulation and control of the coastal waters; and (8) increased research into the effects of ocean disposal pollution and the establishment of appropriate water quality standards. (Deckert-Florida) W75-03697

DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY. For primary bibliographic entry see Field 6E.

W75-03700

U.S. V. COLGATE-PALMOLIVE CO. (ACTION CHARGING UNLAWFUL DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS), For primary bibliographic entry see Field 6E. W75-03702

CITY OF NEW YORK V. TRAIN (ACTION BROUGHT TO COMPEL RELEASE OF FUNDS AUTHORIZED UNDER FWPCA), For primary bibliographic entry see Field 6E. W75-03703

Field 5-WATER QUALITY MANAGEMENT AND PROTECTION

Group 5G-Water Quality Control

STATE OF MINNESOTA V. ENVIRONMENTAL PROTECTION AGENCY (ACTION OF IM-POUNDMENT OF FWPCA FUNDS), For primary bibliographic entry see Field 6E.

KENTUCKY POLLUTION ABATEMENT AUTHORITY For primary bibliographic entry see Field 6E.

INTERSTATE MINING COMPACT AMENDED).

For primary bibliographic entry see Field 6E.

ENVIRONMENTAL PROTECTION ACT (AS AMENDED). For primary bibliographic entry see Field 6E.

COMMITTEE FOR THE CONSIDERATION OF THE JONES FALLS SEWAGE SYSTEM V. TRAIN (ACTION SEEKING INJUNCTIVE RE-LIEF RESTRAINING THE GRANTING OF SEWER HOOK-UP PERMITS), For primary bibliographic entry see Field 6E.

STATE UNIVERSITY SYSTEM OF FLORIDA SEA GRANT PROGRAM 1972. For primary bibliographic entry see Field 6E.

THE NEW FEDERAL WATER POLLUTION George Washington Univ., Washington, D.C. A. W. Reitze, Jr., and G. Reitze.

Environment, Vol 15, No 1, p 19-20, January/February 1973.

Descriptors: *Pollution abatement, *Water pollution control, *Environmental effects, *Enforcement, *Federal Water Pollution Control Act, Rivers and Harbors Act, Navigable waters, Legislation, Legal aspects, Administrative decisions, Administration, Federal government, Water pollution, Pollution control, Water law, Water policy, Adoption of practices.

Identifiers: Refuse Act of 1899, National Environmental Policy Act, Licenses, Adminstrative regulations.

Prior to the Federal Water Pollution Control Act (FWPCA) amendments legislation was ineffective in cleaning up the waters of the U.S. Administrative processes were too cumbersome and time consuming. The FWPCA is made more functional, subsuming nearly all federal law in this field and superceding the state programs except that exist-ing state standards are continued. The scope of FWPCA amendments extends to all U.S. navigable waters. The discretionary powers of the ad-ministrator of the Environmental Protection Agency, are more extensive. Despite the overall positive aspects of the FWPCA amendments major factors prevent this law from being as effec-tive as it could be. First, the enforcement system of the act will not be functional for several years. Second, the permit system used by the 1899 Refuse Act is incorporated into the new act. Thus, all who had applied for a permit are immune from prosecution until their application is processed. (Chennault-Florida)

OFFSHORE TERMINAL AUTHORITY. For primary bibliographic entry see Field 6E. W75-03716 REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS. North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources. For primary bibliographic entry see Field 4A. W75-03717

WATER QUALITY MANGEMENT PLANS-PROPOSED RULES. Environmental Protection Agency, Washington, For primary bibliographic entry see Field 6E. W75-03718

SEA GRANT PROGRAM 1973, STATE UNIVER-SITY SYSTEM OF FLORIDA.
Florida Univ., Gainesville, Marine Advisory Pro-

gram. For primary bibliographic entry see Field 9A. W75-03720

GULF OIL CORPORATION, ET AL. V. MOR-TON (ACTION FOR WRIT OF MANDAMUS). For primary bibliographic entry see Field 6E. W75-03721

GROUNDWATER USE ACT OF 1972. For primary bibliographic entry see Field 6E. W75-03722

TAXATION--EXEMPTION--PROPERTY USED FOR POLLUTION CONTROL OR WATER IM-POUNDMENT. For primary bibliographic entry see Field 6E. W75-03724

UNITED STATES V. REPUBLIC STEEL CORP. (REFUSE DISCHARGE INTO NAVIGABLE WATERS). For primary bibliographic entry see Field 6E. W75-03727

POLLUTANT SPILL PREVENTION AND CON-TROL ACT (AS AMENDED).
For primary bibliographic entry see Field 6E.
W75-03728

INLAND LAKES PROTECTION AND REHA-BILITATION. For primary bibliographic entry see Field 6E. W75-03730

POLLUTION CONTROL AWARDS PROGRAM. For primary bibliographic entry see Field 6E. W75-03731

ANTI-HEAVE PROTECTIVE SYSTEM, Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee) For primary bibliographic entry see Field 8B. W75-03732

POLLUTION SUCTION WATER SWEEPER,

US Patent No 3,847,816, 3 p, 4 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 745, November 12, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, Water quality control, *Water pollution control, Equipment, *Skimming, Separation techniques, Pollution abatement.

Identifiers: *Suction water sweeper.

The pollution suction water sweeper consists of an oil tanker having a series of oil collection tanks and a floating harvesting ring towed in front of the ship by director tugs that are electronically controlled from the ship. The harvesting ring is pulled so as to gather up the oil. The ring consists of a flexible empty accordian-like hose at each end with an apron having weights to hold down the bottom of the apron. Between the ends of the ring, a central portion forms a skimmer and consists of a wide hose. The hose has a series of slotted verti-cal openings on the front side so that the oil slick can enter. The skimmer is connected to two flexican enter. The skimmer is connected to two flexi-ble hoses that pass through openings in the hull and into the ship hold. Gravitation may be em-ployed to move the collected mixture of water and oil to the tank which is below the level of the water. (Sinha-OEIS) W75-03733

ROTARY SKIMMER, Sun Oil Co., Philadelphia, Pa. (assignee) G. D. Aulisa. US Patent No 3,844,950, 4 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 2096, October 29, 1974.

Descriptors: *Patents, *Flotsam, *Skimming, *Oil pollution, *Oil spills, *Water pollution control, Water quality control, Pollution abatement, Equipment, Separation techniques. Identifiers: *Skimmers.

A device for removing floatable material from the surface of a body of water is described. An elongated skimming blade is mounted for rotation, about a vertical axis, across the surface of a liquid, and is rotated about this axis by means of a suitable propulsion device. A collection trough attached to the blade serves as an accumulation means for the skimmed material. A float whose buoyancy is adjustable maintains the blade in a predetermined position relative to the liquid sur-face, the float being anchored to the bed of the body of water being skimmed. The whole conbody of water being skimmed. The whole constitutes a portable rotary skimmer. An air supply or inlet pipe carrying compressed air is coupled through a conventional control valve (operable from outside the housing) to a hose connection which goes to the outer end of the pipe. The valve thus serves to control the flow of compressed air to the jet propulsion devices which cause rotation of the skimming blades, together with their attached collection troughs. (Sinha-OEIS)

PROTECTED OFFSHORE STORAGE FACILI-

Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa. (assignee) W. E. Bliss, Jr.

U. S. Patent No. 3,844,122, 5 p, 15 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 927, No 5, p 1838, October 29, 1974.

Descriptors: *Patents, *Oil pollution, *Water polhution control, Water quality control, *Oi *Pollution abatement, *Storage tanks, Facilities. Identifiers: Crude oil, Offshore storage facilities.

A protected area is provided in a body of water which is subject to wave and tide action and tanks for storing crude oil and the like are moored in the for storing crude ou and the like are moored in the protected area. The tanks are floating tanks and have fixed roofs. The use of a fixed roof instead of a floating roof eliminates the peripheral seals required between a floating roof and the side wall of the tank. The oil or the like stored in the tanks actually supports at least a portion of the weight of the roof and tank, and the unit pressure acting on the surface of the stored liquid is thus greater than that resulting from a standard floating roof. This increase in unit pressure in conjunction with the elimination of the peripheral seal results in a virtually complete prevention of any out-gassing evaporation of the light ends of the stored oil or other liquid. (Sinha-OEIS) W75-03744

RECLAMATION OF HYDROCARBON CONTAMINATED GROUND WATERS,
Sun Research and Development Co., Philadelphia,

For primary bibliographic entry see Field 5D. W75-03750

Bureau of Mines, Washington, D.C. Div. of Non-ferrous Metals. For primary bibliographic entry see Field 6C. W75-03797

ENFORCEMENT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMEND-**MENTS OF 1972,**

Environmental Protection Agency, Denver, Colo.

H. W. Ipsen, and J. W. Raisch. Land and Water Law Review, Vol 9, No 2, p 369-

Descriptors: *Federal Water Pollution Control Act, Legislation, Legal aspects, Water pollution control, Cities, Industries, Jurisdiction. Identifiers: Enforcement.

The 1972 Amendments to the Federal Water Pollution Control Act were passed in an effort to obtain more effective and expeditious attainment of the national goal of cleaning up the country's waters. The various standards and requirements required for compliance with the Act as well as the means which are available for enforcement are described. The jurisdictional and other procedural aspects of enforcement of the Act are discussed in addition to the various civil and criminal remedies which may be used in cases of non-compliance with the may be used in cases of non-compliance with the provisions of the Act. The impact of the new enforcement options on the Environmental Protection Agency is explained and an appeal is made for future voluntary compliance with the Act by affected industries and municipalities. W75-03824

EFFECT OF WATER ON BACTERIAL MUL-TIPLICATION IN PLANT TISSUE,
Department of Scientific and Industrial Research, Auckland (New Zealand). Plant Disease Div. For primary bibliographic entry see Field 5C. W75-03831

AN ELECTRICAL BARRIER FOR PREVENTING MIGRATION OF FRESHWATER CRAY-FISH IN RUNNING WATER: A METHOD TO STOP THE SPREAD OF THE CRAYFISH PLAGUE Uppsala Univ. (Sweden). Inst. for Physiologic

Botany. For primary bibliographic entry see Field 8I. W75-03833

CONTROL OF SALT-MARSH MOSQUITOES WITH ABATE INSECTICIDE AT COOMBABAH LAKES, QUEENSLAND, AUSTRALIA,

Queensland Inst. of Medical Research, Herston (Australia) B. H. Kay, K. J. Ferguson, and R. N. C. Morgan. Mosq News 33(4): 529-535, 1973.

Descriptors: *Insecticides, Pesticides, *Australia, Mangrove swamps, *Mosquitoes, *Salt marshes, Pollution abatement, Water pollution control. Identifiers: *Abate insecticide, Aedes-vigilax, *Coombabah Lakes(Aust), Culex-annulirostris, Culex-fatigans, Culex-sitiens, Queensland.

Four and 4.4% Abate insecticide-sand granule formulations, each applied aerially at 1 lb of formulated product/acre, were 91% and 71% effective against larval Aedes vigilax Skuse and Culex sitiens Wiedemann respectively in a 1971 trial. In 1972, even higher mortalities were indicated. At the dosages used, Abate insecticide caused minimal mortality of non-target organisms tested in natural salt-marsh conditions. Ninety-nine percent kill of larval C. annulirostris Skuse and 87% mortality of C. fatigans Wiedemann exposed in small containers were also recorded. The granules penetrated dense mangrove cover and open country with equal efficiency. A successful application was carried out during a 15-20 knot wind. The insecticide had little residual life in stimulated salt-marsh conditions.--Copyright 1974, Biological Abstracts, Inc. W75-03836

EFFECT OF BIOTIC AND ABIOTIC FACTORS ON THE TOXICITY OF ENTOBACTERIN FOR LARVAE OF BLOOD-SUCKING MOSQUITOES AND BITING MIDGES, (IN RUSSIAN), Akademiya Nauk Kazakhskoi SSR, Alma-Ata. In-

stitut Zoologii. For primary bibliographic entry see Field 5C.

W75-03845

6. WATER RESOURCES **PLANNING**

6A. Techniques Of Planning

USE INTERACTIVE COMPUTER OF GRAPHICS IN WATER PLANNING AND MANAGEMENT, RESOURCES Connecticut Univ., Storrs. Inst. of Water Resources.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 631, \$3.25 in paper copy, \$2.25 in microfiche. Completion Report, 1974, 16 p, 10 fig, 7 ref. OWRT A-042-CONN(5), 14-31-0001-3507.

Descriptors: *Computer programs, *Computer Water models, Water resources, *Planning, *Management, *Graphical techniques, Hydrologic data, Remote sensing, *Algorithms, *Graphical analysis, Graphical methods, Model studies, Massachusetts

Identifiers: Computer graphics, Man-machine interaction, Display-oriented algorithms, ERTS imagery, Hydrological event delineation, Recursive applicability, Cape Cod Canal (Mass).

An experimental graphics system was developed to evaluate its usefulness in the area of water resources planning and management. The system included a conceptual model and a large number of computational techniques, operational programs, and utility routines. A class of display-oriented transformational algorithms were studied in relation to the NASA ERTS imagery. By combining several spectral bands of information, the possibility of delineating various classes of hydrological events (water, land, etc.) in a man-machine environment was examined. The results of a limited experimentation with a section of the Cape Cod Canal and its adjacent land indicate that (a) with the aid of a computer display, the human operator can play a direct and immediate role in selecting and analyzing the portions of the data of particular interest, and (b) speedy display and user's interaction may be achieved by putting the transformational algorithms in a recursive structure. This recursive applicability will allow the algorithms to be applied to expanded data bases without introducing excessive calculations. (de Lara-Con-W75-03301

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I, Kansas State Univ., Manhattan. Dept. of Industri-

al Engineering.
For primary bibliographic entry see Field 5D. W75-0338

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II, Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03388

MULTILEVEL APPROACH FOR REGIONAL WATER RESOURCES PLANNING AND MANAGEMENT, VOLUME I, Case-Western Reserve Univ., Cleveland, Ohio. Y. Y. Haimes.

Available from the National Technical Information Service, Springfield, Va 22161, as PB-227 132, \$9.25 in paper copy, \$2.25 in microfiche. Prepared for National Science Foundation, August 1973. 294 p, 26 fig. 15 tab, 126 ref, 5 append. GI-34026.

Descriptors: "Water resources, "Planning, *Mathematical models, "Management, "Regional analysis, Optimization, Methodology, Model stu-

dentifiers: Multilevel approach, *Hierarchical modeling, Decomposition, Multilevel coordina-tion, Supply scheduling model, Demand economic model, Co-ordination model, *North Atlantic Re-

The development and analysis of an economically-based methodology for long-range planning of regional water resource systems are discussed. Hierarchical modeling, which accounts for the complexity of regional considerations, consists of two main broad categories of techniques and structural representations. First, decomposition is the term applied to the class of techniques used to divide a complex system into smaller more easily handled components. Second, multilevel coordina-tion complements decomposition models since it is usually necessary to account for the interactions decoupled when a complex system is decomposed. The purpose of multiple levels of optimization, simulation or control is to coordinate the decomposed solutions so that the overall sum of solutions meets a particular goal or objective. Methods of decomposition and multilevel coordination, as well as a method for solving multiple objectives, are discussed. The major planning model discussed is decomposed into three major components, supply (cost) scheduling model, demand (benefit) economic model, and co-ordination model. The North Atlantic Region, which includes all or portions of 13 states and the District of Columbia, was selected for testing the methodologies and models developed in the study. A goal has been the maximum utilization of models, data, and experience developed and obtained by the North Atlantic (Diefendorf-North Region study. Carolina) W75-03434

ENERGY EVALUATION OF WATER MANAGE-MENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA, Environmental Protection Agency, Gainesville,

S. Bayley, and H. T. Odum. Available from the National Technical Informa

tion Service, Springfield, Va 22161, as PB-227 051, \$5.25 in paper copy, \$2.25 in microfiche. May 1973. 114 p, 19 fig, 15 tab, 62 ref.

Descriptors: *Water management, *Water conservation, *Energy, *Ecosystems, *Marshes, *Decision making, Land use, Planning, Costbenefit analysis, Reservoirs, *Florida, Model studies, Water levels, Flood plains.

Group 6A—Techniques Of Planning

Identifiers: *St. Johns River Basin(Fla), Brevard County(Fla), Energy value, Energy evaluation, Energy amplifier factors, Channelization, Energy amplifier factors, Channel Development trends, Energy circuit model.

A section of the upper St. Johns River basin was selected as a pilot test of energy evaluation procedure for decision making. Energy value cal-culations were made for present and primitive conditions and 3 alternatives for water management: a pattern of private channelization of lands for agriculture and housing; a reservoir plan that sends more water to agriculture and urban use in other districts; and a plan that retains the floodplain for water conservation areas. Proposed changes in water management and land use shift the distribution of energy values and thus change the totals of energy generated by regional scale in-teractions of lands, waters, cities, and outside sources of money and energy. The pilot area calcu-lations suggest energy amplifier factors for water for alternatives of marsh use, lightly managed pasture and intensive agriculture, and urban development based on water-using industries, on light industry, and on tourism and retirement. The energy cost-benefit approach used avoids several fallacies common to other evaluations of environ-mental change. By considering the total system, the deceptively high amplifier effects of processes examined in isolation are avoided. Using this ap-proach calculations showed the plan for retention of marshes produced the highest total annual energy value, suggesting this plan as the one most favorable to economic vitality. The lowest values were found with further private channelization and development of the kind of agricultural production now practiced. (Diefendorf-North Carolina) W75-03436

BINARY TREE MODEL SIMULATION OF THE BEHAVIOR OF URBAN HYDROLOGIC

SYSTEMS, Nebraska Univ., Lincoln, Dept. of Computer Science. For primary bibliographic entry see Field 2A. W75-03541

RANGE OF CUMULATIVE SUMS, II. APPLICA-TION TO STORAGE CAPACITY OF RESER-

VOIRS. Colorado State Univ., Fort Collins. For primary bibliographic entry see Field 2H. W75-03669

WATER QUALITY MANGEMENT PLANS-PROPOSED RULES.

Environmental Protection Agency, Washington, D.C. For primary bibliographic entry see Field 6E. W75-03718

6B. Evaluation Process

OF INTERACTIVE COMPUTER GRAPHICS GRAPHICS IN WATER PLANNING AND MANAGEMENT, RESOURCES Connecticut Univ., Storrs. Inst. of Water Resources. For primary bibliographic entry see Field 6A. W75-03301

DISPLACEMENT OF PERSONS BY MAJOR PUBLIC WORKS, ANTHROPOLOGICAL ANALYSIS OF SOCIAL AND CULTURAL BENEFITS AND COSTS FROM STREAM CON-TROL MEASURES...PHASE 5, Kentucky Water Resources Research Inst., Lex-

P. Drucker, C. R. Smith, and E. B. Reeves. Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 627, \$5.25 in paper copy, \$2.25 in microfiche. Research Report No 80, December 1974. 100 p, 4 tab, 16 ref, append. OWRT A-046-KY(1). 14-31-0001-3817.

Descriptors: *Social change, *Social impact, *Human population, *Relocation, Planning, Evaluation, Benefits, Costs, Utilities, Area redevelopment, Compensation, *Migration, *Social adjustment. Identifiers: Emigration(Human), Cultural adapta-tion(Human), *Anthropological analysis.

This study is concerned with social change and so-This study is concerned with social change and so-cial impact of a major public works project on the human population required to relocate the persons being forced to sell to the Federal Government or turn over through condemnation proceedings homes, farms, and/or businesses to facilitate completion of a Federally authorized stream con-trol measure. It is intended to test the utility of authorophysical method and concert in evaluating anthropological method and concept in evaluating and explicating sociocultural impact, and in addi-tion to check hypotheses concerning importance tion to check hypotheses concerning importance of impact on social and economic areas of culture of the persons to be displaced, on their emigration patterns, and their cultural adaptation, and other social effects of relocation. Application of anthropological concepts and methods yield more intelligible results than sociological studies based on data generation through highly artificial questionnaire methods with attempted quantification of what are basically non-quantifiable data tion of what are basically non-quantifiable data. This does not mean that simple counts and raw percentage comparisons are not significant to demonstrate trends, but that complex arithmetic computations are often used to imply a degree of precision that does not exist and explains nothing. Social scientists, planners and change agents must come to realize that there are aspects of the quality of human life which must be considered which cannot be defined in numbers. (Grieves-Kentucky) W75_03308

FACTORS INFLUENCING PARTICIPATION IN RECREATION ACTIVITIES IN SOUTHEAST IOWA, AND CAMPER ATTENDANCE AT MAC-BRIDE STATE PARK,

Iowa Univ., Iowa City. Recreation Education Pro-

M. Glascock.

M. Giascock. Available from the National Technical Informa-tion Service, Springfield, Va 22161 as PB-238 630, \$3.75 in paper copy, \$2.25 in microfiche. Supple-ment to Completion Report, May 30, 1973. 24 p, 11 tab. OWRT B-017-IA(3).

Descriptors: *Recreation demand, *Motivation, *Iowa, Recreation, *Social participation, Social value, Decision making, *Surveys, Camping. Identifiers: Linn County(Iowa), Johnson County(Iowa), Macbride State Park(Iowa).

Factors influencing individuals' involvement in recreation were evaluated through a mail survey conducted in two southeastern Iowa counties. The questionnaire consisted of a list of 72 recreational activities and questions which covered socio-economic and demographic characteristics. Results indicated that the five most popular activities were passive in nature and take place within the home. These include reading, listening to the radio or music, and watching television. The most popular outdoor activities include pleasure walking, gardening, pleasure driving, swimming, and bird watching. Individuals with higher educational levels were more likely to engage in tennis, golf, sailing, civic work, or attend concerts. A majority sating, civic work, or attend concerts. A majority of the recreational activities surveyed were not related to sex, age, marital status, occupational status, income level, or residential location. Results of a 1970 study of campers in Iowa's Lake Macbride State Park, utilizing data obtained from camping permits, are also summarized. A majority of the campers were from Iowa with five counties contributing over 1000 camper days in 1970. There was a strong linear increase in camping through July followed by a decline beginning in August. W75-03317

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM. Iowa State Water Resources Research Inst., Ames; and Iowa State Univ., Ames. Engineering For primary bibliographic entry see Field 6G. W75-03318

AN ANALYSIS OF SOCIAL WELL-BEING CHANGE ASSOCIATED WITH RESOURCE DEVELOPMENT PROJECTS IN WYOMING, Wyoming Univ., Laramic. Water Resources M. Hackbart, G. Long, and M. York. Available from the National Technical Inform

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 634, \$5.25 in paper copy, \$2.25 in microfiche. Research Project Report, June 1973. 115 p, 15 fig, 28 tab, 24 ref, 2 append. OWRR A-002-WYO(7).

Descriptors: *Cost-benefit theory, *Wateresources development, Planning, Measurement Social impact, Social change, Welfare(Economics), *Wyoming, US Water Resources Council, Evaluation. Identifiers: *Social well-being, Economic evalua-

A recent Water Resources Council Task Force recommendation to include social well-being (SW) as an objective in addition to national econom development for water resource development projects is assessed and a series of proxies to measure social well-being are evaluated for several water resource development projects in Wyoming. The choice of proxies is important because SW cannot be measured directly. An appropriate selection should yield operationally meaningful (capable of identifying change) and feasible (those with data available) proxies. Four general categories of available) proxies. Four general categories of proxies to measure the changes in SW were evaluated: (1) real income changes and distributional impact measurement changes in per capita income, changes in the percentage of households over the poverty line, and changes in the Lorenz curve or Gini ratio; (2) changes in population; (3) changes in economic stability through an entropy measure of employment stability; and (4) changes in educational or recreational patterns. Results of comparing Wyoming counties with and without such projects reveal no consistent proxy variation pattern. The implication appears to be that the projects had not significantly changed the project re-gion's SW, although data difficulties make this in-conclusive. Appendix A provides an overview of the major river basins in Wyoming. (Schroeder-Wisconsin) W75-03319

HYDROLOGIC SIMULATION OF A COMPLEX

WATERSHED, Washington State Univ., Pullman. Coll. of Engineering. For primary bibliographic entry see Field 2A. W75-03325

OPPORTUNITIES FOR WATERSHED MANAGEMENT IN WYOMING, Their Laramie, Water Resources For primary bibliographic entry see Field 4D. W75-03326

ECONOMIC EVALUATION AND DETERMINA-TION OF PLANT CAPACITY AND DAM HEIGHT,

Public Power Corp., Athens (Greece). D. A. Xirokostas. Water Power, Vol 26, No 1, p 17-22, January 1974. Descriptors: *Cost-benefit theory, *Hydroelectric plants, Economic efficiency, Prices, Hydroelectric power, Peak loads, Peaking capacity, Costs, *Cost-benefit ratio, *Dam design, *Optimization, *Alternative costs, Evaluation.

A new benefit-cost ratio method for comparing different hydroelectric plants is devised to yield optimum dam height and installation capacity value. The new ratio is given by the ratio of the an-nual cost of the alternative plant plus the annual cost of replacing secondary energy (benefits) di-vided by the annual cost of the hydroelectric plant. Annual cost of the alternative thermal plant is determined through examination of the resultant costs to provide similar primary energy levels. Costs of secondary energy are assessed separately utilizing the average incremental costs of fuel consumed in a system of oil-fired steam turbines. In the past capacity of the hydrostation was chosen so that the costs of output are minimal. This criterion is unsatisfactory because of its failure to account for peak-load needs or its load duration curve. In essence, it assumes a unique price of energy for all bonds of power on the load duration curve. The appropriate approach suggested to determine capacity would equate the incremental cost of the hydroelectric station and the alternative thermal plant. Height of the dam is also varied under the model to maximize the difference between benefits and costs of the proposed system. (Schroeder-Wisconsin) W75-03328

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY, Resources for the Future, Inc., Washington, D.C.

Resources for the Future, Inc., Washington, D.C. J. L. Fisher, and R. G. Ridker. American Economic Review, Vol 63, No 2, p 79-89, 1973. 1 fig, 2 ref.

Descriptors: *Environmental effects, *Growth rates, *Population, Resources, Mathematical models, Natural resources, Environmental gradient, Social aspects, Costs, Model studies, *Mathematical models.

Results of a recent Resource for the Future (RFF) study concerning the interrelationship of popula-tion, growth, natural resource demand, and environmental quality parameters are summarized. The study dealt with a selected number of raw material, pollutant, and environment pressures as-sociated with both population and economic growth in the U.S. over a 30-50 year period. Four sets of high-low combinations of population and economic growth are traced through a mathematical model to reveal impacts of specified resources and environmental measures and on specific sec-tors, e.g., agriculture or energy. Modeling results indicate the U.S. is unlikely to experience a truly serious raw material shortage (defined as a greater than 50 percent relative price increase for a significant number of factors) over the study period. Several critical factors affecting the above results are noted. These include the time period of the study, the geographic region selected, regional development characteristics, institutional arrange-ments, and technical changes. Costs of carrying out policies to clean up the environment were relatively inexpensive. Implications of full cost raw material pricing, improved reclamation and recycling technics, and better planning and management procedures are also discussed. (Schroeder-Wisconsin) W75-03331

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS,

Texas Univ., Austin. Dept. of Chemical Engineering. For primary bibliographic entry see Field 6D. W75-03341 MARGINAL COST ESTIMATES OF THE WATER RESOURCES OF THE USSR, Council for the Study of Productive Forces, Alma-Ata (USSR).

A. N. Yegorov, L. N. Zylina, V. P. Ivanova, B. Yw. Istoshim, and Ye. M. Podlskiy. Soviet Geography, Review and Translation, Vol 15, No 6, p 333-341, 1974. 2 fig, 2 tab, 3 ref. Translated for Vodnyye Resursy, No 5, p 198-204, 1973.

Descriptors: *Water resource development, *Marginal costs, Optimum development plans, Regional development, Foreign projects, Foreign countries, Water supply, Industries, *Costs, *Estimating.

*Estimating: *USSR.

A preliminary water resource development plan to meet projected water demands in the Soviet Union over the next three decades is outlined. Marginal cost estimates are also provided representing the minimum incremental development costs of a particular river system per additional disposable water resource in a given area. Water requirements for a region are based on forecasts of increased water usage corresponding to relatively moderate rates of irrigation development (30 million hectares by 2000). Proposed river development projects were based on technical, economic, and planning data obtained from the appropriate engineering design and scientific research in-stitutes. Results of the marginal cost estimates varied significantly among regions ranging from 0 to over 25 kopecks/cubic meter. The wide divergence will affect location plans to many industries, especially those heavily water-intensive industries where water costs represent 40-50% of the total cost differences between locations. (Schroeder-Wisconsin) W75-03342

ECONOMIC DEVELOPMENT AND WATER RESOURCES INVESTMENTS.

Rivkin/Carson, Inc., Washington, D.C. Available from the National Technical Information Service, Springfield, Va 22161, as PB-225 935, \$10.50 in paper copy, \$2.25 in microfiche. Report August 1973. 11 maps, 27 tab, 56 ref, 6 append. Bu Rec 14-06-D-7336.

Descriptors: *Regional economics, *Water resources development, *Economic impact, Regional analysis, Regional development, *Investment, Planning, Data collections, Boundary processes, Econometrics, Cost-benefit analysis, *Rocky Mountain Region, Arizona, New Mexico, Colorado, Utah, Wyoming. Identifiers: Economic growth.

Three studies involving: (1) development and growth analysis of subregions within defined study areas; (2) community case studies; and (3) public investment analysis are utilized to examine and conceptualize the relationship of regional growth and water and other public economic development investments. The study areas include 21 subregions in Arizona, Colorado, New Mexico, Utah, and Wyoming and communities presently receiv-ing Bureau of Reclamation water. Central to the approach is recognition that project impacts do not coincide with political boundaries. To compensate, multi-locational relationships of population, economics, and physical characteristics were used to develop new investigation regions. Case studies indicate that water resource investment is only one of several factors affecting growth, and its impact varies in size and location over time. Subregional analysis also indicates that population, urban cen-ters, accessibility, environmental factors, available institutional resources, markets, and technological characteristics affect growth pat-terns. Three econometric investment analyses of the relationship between regional economic ties, employment, population growth, and public investment indicate that water-related investment affects both the level of economic activity and growth; with the latter's effect dependent on the state of the regional economy and the presence of other non-water investments. (Schroeder-Wisconsin) W75-03343

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY, Environmental Protection Agency, Washington, D.C. Office of Research and Development. For primary bibliographic entry see Field 5A. W75-03347

THE INFLUENCE OF RECENT TRENDS IN WATER LEGISLATION ON THE STRUCTURE AND FUNCTIONS OF WATER ADMINISTRATION.

Fordham Univ., Bronx, N.Y. School of Law. For primary bibliographic entry see Field 6E. W75-03363

WILLINGNESS TO PAY FOR POLLUTION ABATEMENT: A CASE STUDY, Guelph Univ. (Ontario). For primary bibliographic entry see Field 5G. W75-03389

RECONCILING CONFLICTS AMONG DIF-FERENT ECONOMIC INTEREST GROUPS IN THE MANAGEMENT OF FISHERIES,

Fisheries and Marine Service, Ottawa (Ontario). W. C. MacKenzie. Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2065-2069, 1973. 6 ref.

Descriptors: *Fisheries, *Fish management, Fish harvest, Economic efficiency, Planning, Optimum development plans, International waters, Treaties, *Marginal costs, Management. Identifiers: *Social costs.

It is argued that the diverse interests involved in fisheries can best be served if fish are harvested to the point where the marginal social resources equal the marginal social resources equal the marginal social cost. Often, the implementation of such policies by regulatory agencies are made after the industries' development. A rational management approach in such cases should assure that it does not contribute to the distortion of imputs, that it does not diminish technological innovation, it is capable of being applied at varying rates for different grounds and seasons, it is capable of being imposed gradually to minimize industrial disruption, and it does not discriminate against any unity of the fishing fleet. Management of fisheries is complicated because fleets of many countries may harvest the same ground. Countries often place differing values on capital, labor, and the fishery output creating difficulties in establishing a unified management approach. For the present, establishment of annual catch quotas for interested countries appears to be the most reasonable solution. The setting of quotas among countries is fraught with difficulties. Several alternative methods to reconcile the conflicts arising among fishing nations are discussed including quota-shore trading, compensation for abstention, and exchange of (fleet and port) services. (Schroeder-Wisconsin)

THE ECONOMIC EFFECTS OF THE 1971 FLORIDA RED TIDE AND THE DAMAGE IT PRESAGES FOR FUTURE OCCURRENCES, Mote Marine Lab., Sarasota, Fla. For primary bibliographic entry see Field 5G. W75.0339

GREAT LAKES-ST. LAWRENCE SEAWAY SYSTEM AND THE MID-CONTINENT ECONO-

MY, Great Lakes Basin Commission, Ann Arbor, Mich. L. J. Goodsell.

Group 6B—Evaluation Process

Water Resources Bulletin, Vol 8, No 5, p 1061-1067, 1972,

Descriptors: *Great Lakes, Environmental effects, Economics, Regional development, Navigable rivers, *Income, Institutions, *Transportation, *St. Lawrence River, Inland waterways, River basin development.

Since the time of early explorers, the Great Lakes-Since the time of early explorers, the Great Lakes-St. Lawrence River complex has represented a major link in the U.S. transportation system. Three aspects surrounding the complex are ex-plored: (1) the economic impacts, (2) environmen-tal impacts, and (3) the institutional milieu. Since 1966, seaway traffic has grown from 49 million tons to 51.1 in 1970 (44.6 in bulk and 6.5 in general cargo). A summary of several recent studies in-dicates total direct and indirect income resulting from the complex's activity came to \$643 million in 1968 and provided employment for over 85,000 families. Several environmental benefits resulting from waterborne transportation, including lower energy consumption than rail, and minimal at-mospheric emission, are noted. Impacts on water quality of spills, discharges, and floatation of vessels are minimized. A number of institutional changes brighten the complex's economic future. These include a reexamination of water and rail freight rates to bring about a more equitable distribution of traffic, and extension of the navigation season, and development of new facilities and vehicles. (Schroeder-Wisconsin) W75-03394

THE IMPACT OF WATER RESOURCE QUALI-TY CHANGES ON SURROUNDING PROPERTY VALUES,

Dornbusch, David M. and Co., Inc., San Francisco, Calif.

For primary bibliographic entry see Field 5G. W75-03395

PROPOSED NATURAL AREAS, SALT RIVER SALT BANKS, REPORT NO 2,
Arizona Academy of Science, Tempe.

E. L. Smith, and G. L. Bender.

Available from the National Technical Information Service, Springfield, Va. 22161, as PB-225 218, \$3.25 in paper copy, \$2.25 in microfiche. Arizona Office of Economic Planning and Development, Phoenix, Report OEPAD-EP-73-2, June 1973. 10 p.

Descriptors: *Natural resources, *Arizona, *Conservation, Preservation, Land management, Land classification.
Identifiers: *Salt River Salt Banks(Ariz).

Arizona's Academy of Science has recommended the establishment of the Salt River Salt Banks as a Scientific Natural Area (NA). The banks are on the Fort Apache Indian Reservation on the north shore of the Salt River. The area of salt deposition is nearly one mile in length, 100 feet in width, and is nearly one mile in length, 100 feet in whith, and between 50-75 feet above the river bed. Three nearby springs flowing over the bank form stallactites. Formerly existing springs may have been the source of the depositions. Climate of the area is typical of southern Arizona desert areas. Terrestrial fauna likely to be encountered are representative of lower Sonoran desert areas. Rare and endangered species of native fish including the Colorado River squawfish, loach minow, humpback sucker are also found in the area. Past disturbances have been minimal. Presently a camping area and jeep trail have been located near the salt bank. The level of utilization of these facilities is yet unknown. The unique geology of the salt bank plus the character of the Salt River, a wild free-flowing river, are important reasons to establish the site as a scientific NA. Its inaccessibility prohibits its usefulness as an educational NA. (Schroeder-Wisconsin)

ALTERNATIVES AQUACULTURAL IN DEVELOPMENT: CONSIDERATION OF EX-TENSIVE VERSUS INTENSIVE METHODS. National Marine Fisheries Service, Galveston,

Tex. Biological Lab. R. A. Neal.

Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2218-2222, 1973.

Descriptors: *Economic impact, *Fish management, Social impact, Political aspects, Fisheries, *Aquiculture. Identifiers: Extensive culture. Intensive culture.

Legal, biological, economic, environmental, and social aspects arising from the development of extensive versus intensive aquaculture practices are surveyed. Extensive practices raise fish or shellf-ish in natural settings with little environmental modification; intensive practices involve sizable environmental manipulation. Extensive practices face sizable legal problems though their use of public land; the need to restrict passage through navigable waters to restrain aquatic species; and their inability to claim legal ownership of stocked species placed in natural water bodies. Biologically, the benefits from each practice depend on the species, feeding habits, behavior, and environ-mental requirements. Herbivorous filter feeders which utilize a wide range of plants are best raised through extensive methods. Four economic aspects, facility cost, competing uses of the natural waters, operational costs, and dependability, were also examined. Initial facility costs are generally higher for intensive practices, while indirect costs to other water resource users are higher for extensive culture practices. Extensive culture systems are notably more subject to losses due to environmental changes. Both practices are subject to externalities arising from the use of a common property. Under present conditions, for most carnivorous and omnivorous species of interest to aquaculturalists, expenditures for extensive practices are not found justified. (Schroeder-Wisconsin) W75-03398

TACNA MARSH. NATURAL AREA REPORT

Arizona Academy of Science, Tempe. E. L. Smith, and G. L. Bender. Available from the National Technical Information Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as PB-225 249, \$3.25 in paper copy, \$2.25 in microfiche. Re-port No OEPAD-EP-73-35, June 1973. 11 p, 1 fig. HUD CPA-AZ-09-16-1008.

*Conservation. *Freshwater Descriptors: Descriptors: "Conservation, "Freshwater marshes, "Arizona, Natural resources, Land management, Preservation, Land classification, "Marsh management, Wildlife management. Identifiers: Gila River(Ariz), "Tacna Marsh(Ariz), Educational natural area, Recreational natural

Tacna Marsh on the Gila River in Yuma County, Arizona is recommended as an educational or recreational natural area. The marsh contains the largest water bodies along the lower Gila River One area of open water, five acres in size and about two feet deep, is surrounded by cattails, arrowweed, and salt cedar. A second area of more than ten acres, located immediately upstream from the first, has brush scattered throughout the pond. Both ponds provide water for wildlife and vegetation, but each benefits different species. Also, several species now known to nest in either pond are rarely found elsewhere in the state. Channelization, irrigation, and reservoir projects in the area have had varying impacts on the marsh's ecological state. Rising water tables, increased salinity, and uprooted trees are among the physical changes resulting from increasing activities in the region. Establishment of the marsh as a natural area would benefit students and bird watchers in addition to maintaining the habitat of nesting birds rarely found outside of the marsh. (SchroederW75-03400

MULTILEVEL APPROACH FOR REGIONAL WATER RESOURCES PLANNING A
MANAGEMENT, VOLUME I,
Case-Western Reserve Univ., Cleveland, Ohio.
For primary bibliographic entry see Field 6A.
W75-03434

EVALUATION OF THE GEORGIA WATER SUPPLY PROGRAM.
Environmental Protection Agency, Atlanta, Ga.

For primary bibliographic entry see Field 5F. W75-03435

ENERGY EVALUATION OF WATER MANAGE-MENT ALTERNATIVES IN THE UPPER ST. JOHNS RIVER BASIN OF FLORIDA, Environmental Protection Agency, Gainesville,

For primary bibliographic entry see Field 6A. W75-03436

EAST BRIMFIELD AND WESTVILLE RESERVOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVER-MASSACHUSETTS.

Public Health Service, New York. For primary bibliographic entry see Field 6D. W75-03437

PERSPECTIVES ON COASTAL MANAGE-MENT-MARINE TRADES AND THE COASTAL CRISIS

Rhode Island Univ., Kingston. Coastal Resources M. I. Grant

Marine Bulletin Series No 18, 1974. 8 p. 1 tab.

waters.

Descriptors: *Coasts, *Distribution, *Competing uses, *Recreation demand, *Economic impact, Political contraints, Institutional constraints, Governments, Regulation, Comprehensive planning, Planning, Water resources development, Economics, Legal aspects, Political aspects, Water rights, Water policy, Social impact, Water demand, Recreation, Decision making, Land tenure, Public rights, Public access, Evaluation, Identifiers: *Coastal zone management, *Coastal

Some of the problems facing the nation's shorelines and their present and future effect upon the marine trades are examined. Despite the growing demand for marine recreation activities, the marine trades are hampered by the present system of land distribution and the frequently fragmented and disjointed efforts of government to improve conditions in the coastal zones. The present system for distributing coastal lands among the various competing uses breaks down both in the marketplace and in the political arena. Recreational uses are at a competitive disadvantage in a market that distributes the limited supply of a coastal lands to those most able and willing to pay for it. The political system fails to identify and protect the interests of the public due to parochialism within government and apathy on the part of the public. Only through a united effort of the many independent marine trades pressuring government for a comprehensive coastal management program will the interests of the industry, and of the public, be effectively protected. (Deckert-Florida) W75-03458

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA. Commission on Rural Water, Washington, D.C. For primary bibliographic entry see Field 5D.

Cost Allocation, Cost Sharing, Pricing/Repayment—Group 6C

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING,

H. P. Odegard.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 721, \$7.00 in paper copy, \$2.25 in microfiche. Peter Odegard, St. Croix Cove, Hudson, Wis., 1974. 198 p, 171 ref. ISBN 0-9600524-2-9. OWRT C-3084(3683)(1). 14-31-0001-3683.

Descriptors: *Planning, *Evaluation, *Methodology, *Social participation, *Systems analysis, *River Basin Commissions, *Analytical techniques, Coordination, Decision making, Creativity, Analyses, Control, Data collections, Education, Water Resources Planning Act, River basin development, Legislation, Governments, Forecasting, Benefits, Testing, Administration, Management, Political aspects, Institutions, Regional analysis

Identifiers: Audit, Rules, Bargaining, Intention, Plan formulation, Democracy, Comprehensiveness, Planning proganization, Planning procedure, Needs, Goals, Policy, Alternatives, Clarity, Mediator, Problems approach, Public interest, Experiment, Inquiry, Sensors, Pathors.

Planning is a political process. It is grounded in bargaining and self-education (inquiry). It must be democratic. Planning audit pushes beyond criticism and evaluation, concentrating instead on repairing whatever may have gone amiss. Here is a theory for systematic planning audit. The framework of sensor and pathor questions pro-vides the basic auditing tool. It is designed to stimulate rethinking of sustaining philosophies and accepted procedures, and to identify specific pathologies. A two-pronged approach is recommended--with auditors from inside the planning process enlisting outside help. Test-out of this system indicates need for far-reaching reform of planning theory and methodology. Major changes are urged: (1) a new direct democracy of citizen participation based on transparency of the planning process; (2) a top-down, pragmatic, problem-centered approach emphasizing general systems theory and displacing the goal-centered approach; (3) diverting effort away from devising make-believe alternatives and into developing policies for simple acceptance or rejection at higher levels; (4) using Rules of Release (listed here)-counterpart to Rules of Order (Robert's)--for administrative bargaining situations, rules designed to combat secrecy, conformance, and horsetrading, and to promote creativity. Major objective: to improve river basin planning. Basic un-derstandings, applications and illustrations are drawn from water resources planning experience. W75-03525

CHAPARRAL CONVERSION POTENTIAL IN ARIZONA. II. AN ECONOMIC ANALYSIS, Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. For primary bibliographic entry see Field 3B. W75-03573

WATER QUALITY MANGEMENT PLANS-PROPOSED RULES. Environmental Protection Agency, Washington,

D.C. For primary bibliographic entry see Field 6E. W75-03718

RECENT LIMNOLOGICAL STUDIES OF OKANAGAN BASIN LAKES AND THEIR CONTRIBUTION TO COMPREHENSIVE WATER

RESOURCE PLANNING, Fisheries Research Board of Canada, West Vancouver (British Columbia). Pacific Environment

For primary bibliographic entry see Field 2H. W75-03769

CATEGORY VERSUS SUCCESSIVE-INTER-VALS SCALES, California Univ., Berkeley. School of Public

California Univ., Berkeley. School of Publ Health.

W. H. Bruvold. Perceptual and Motor Skills, 1974, Vol 38, p 207-210, (California Water Resources Center Project UCAL-WRC-W-359). 1 fig, 8 ref.

Descriptors: *Reclaimed water, *Recirculated water, Water reuse, *California, Potable water, Swimming, *Attitudes, Evaluation.

The relationship between scale values of magnitude obtained from category and successive-intervals scaling procedures is expected to be nonlinear in many cases. This research presents the hypothesis that the relationship will be linear if discriminal dispersions are constant and specifiably concave if these dispersions systematically increase or decrease with magnitude. The data represent the case of constant discriminal dispersions and the prediction for this condition are supported. (Snyder-California, Davis) W75-03802

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ON TAXATION AS A POLLUTION CONTROL POLICY.

Pittsburgh Univ., Pa. Graduate School of Business.

For primary bibliographic entry see Field 5G. W75-03329

HOW DO YOU EXPLAIN THE COST, LFE Control System Industries, Santa Clara,

O. G. Ridgeway. Water and Wastes Engineering, Vol 11, No 2, p 49-50, 60, 1974. 2 fig, 2 tab.

Descriptors: *Public utilities, *Automatic control, *Control systems, Water works, Data collections, *Costs, Digital computers, Automation, Capital costs, *Treatment facilities, Operating costs.

Savings from installation of an automated control system (DIGIDAC-digital data acquisition and control) in a water or waste water system are explored. Only a small number of DIGIDAC systems have been installed making cost performance data scarce. The overall approach to cost justification comes from LFE/CSI's computer system experience, extensive review of water/waste industry literature, and comments by senior systems engineers at the American Water Works Service Company. Several benefits are noted. Estimates indicate that an effective management information system should improve overall management by two to five percent. Cost savings include: (1) capital development cost savings resulting from reduction of over- or under-design of capital facilities, (2) chemical cost savings by the elimination of measurement errors, (3) power savings, and (4) economic dispatch savings. Some labor savings are also noted. Use of the automatic control system is also valuable in providing data on the need for rate increases, thereby reducing much of the subjectivity involved in that decision. (Schroeder-Wisconsin)

PURIFIED WASTEWATER-THE UNTAPPED WATER RESOURCE.

Envirotech Corp., Menlo Park, Calif. For primary bibliographic entry see Field 5D. W75-03337

FINANCING RESOURCES FOR FISHERY DEVELOPMENT,
Inter-American Development Bank, Washington,

J. Luna-Munoz. Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2059-2064, 1973.

Descriptors: *Fish management, Fishing, Fish harvest, Commercial fishing, Financing. Identifiers: *Fisheries financing, *Fishery development, Developing countries.

The sources of, needs for, problems related to, and analysis undertaken in the provision of financial arrangements for fishery development are outlined. In general, three types of development projects are considered: (1) specific projects related to a particular fishery area and independent of areas; (2) integrated projects involving almost all areas in the fishery sector; and (3) integrated projects which attempt to aid fishery development as part of the integrated economy. Each of the general forms have differing financial require-ments and differing available financial sources. Failures or difficulties in financial arrangements for each may be attributed to lack of data about the resource or the recipient, inadequacy of the infrastructure or supportive services, low technical management or skills, and lack of marketing or distribution systems. Funding sources continue to supply money, however. Major contributors inlocal resources from the private sector, national resources, private foreign investment or credit by equipment suppliers, and resources from bilateral or multilateral agreements. Financing of fishery development is generally undertaken fol-lowing an attempted thorough analysis. Three steps are involved in the multilateral analysis: preinvestment data collection and project designing; technical, financial, economic, institutional, and legal analysis of alternative project designs; and execution and feedback of information. execution and feedback (Schroeder-Wisconsin) W75-03339

HOUSTON SUBURBS PROFITS FROM BUILD-ING THE STATE'S WASTEWATER TREAT-MENT PLANT.

For primary bibliographic entry see Field 5D. W75-03340

ECONOMIC DEVELOPMENT AND WATER RESOURCES INVESTMENTS, Rivkin/Carson, Inc., Washington, D.C. For primary bibliographic entry see Field 6B. W75-03343

1971 SALMON RIVER ESTUARY RESOURCE USE STUDY.

USE STUDY, Oregon Fish Commission, Salem. Div. of Management and Research.

T. Gaumer, D. Demory, and L. Osis. Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10345, \$3.25 in paper copy, \$2.25 in microfiche. Report November 1973. 24 p, 6 fig, 16 tab. NO4-3-208-55, NOAA N208-0073-72(N), DACW 57-72-C-

Descriptors: *Estuaries, *Recreation, *Oregon, Fish management, Fishing, Sculpins, Crabs, Shrimp, *Fisheries. Identifiers: *Resource use, Tideflat, *Salmon River Estuary(Ore).

In March-October, 1971 the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates within the Salmon River Estuary. The estuary, located 119 miles south of the Columbia River, consists of a 204 acre bay with 126 acres of tideland. During the study, 285 boat, shore, tideflat, and scuba resource users were interviewed to aid in the construction of a series of marine resource maps. These maps illustrate principal boat fishing areas, clambeds, eel grass beds, food production areas, fish feeding areas, and fish migration routes. Recreation user data compiled

Group 6C-Cost Allocation, Cost Sharing, Pricing/Repayment

indicates that 3,000 user trips (800 boat, 2,100 shore, and 100 tideflat) harvested 4,500 animals (1,900 fish, 1,700 shrimp, and 900 crabs) in the estuary during the study period. Dungeness crabs comprise 54% of the boat anglers' catch and finfish, primarily Pacific staghorn sculpin, was the major catch of the shore anglers. Shrimp was the only species harvested by the tideflat users. No commercial fisheries exist in the estuary. (Schroeder-Wisconsin) W75-03344

1971 SAND LAKE ESTUARY RESOURCE USE STUDY, Oregon Fish Commission, Salem. Div. of Manage-

ment and Research.

T. Gaumer, D. Demory, and L. Osis.

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as COM-74-10341, \$3.25 in paper copy, \$2.25 in microfiche. Report November 1973. 24 p, 6 fig, 16 tab.

Descriptors: *Estuaries, *Oregon, Fish management, *Fisheries, Eels, Clams, Crabs, Inverment, *Fisheries, Eels, Clams, Crabs, inver-tebrates, Mapping. Identifiers: *Resource use, *Marine resource map,

*Sand Lake Estuary(Ore).

In March-October 1971, the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates (with the exception of anadromous species resources) in the Sand Lake Estuary. The 528acre estuary, located 90 miles south of the Columbia River, contains 397 acres of tidelands. During the study 938 boat, shore, tideflat, and scuba resource users were interviewed to aid in the construction of a series of marine resource maps illustrating principal boat fishing areas, clam beds, eel grass beds, food production areas, fish feeding areas, and fish migration routes. Recreation data compiled indicates that 9,800 resource user trips (200 boat, 6,000 shore, and 3,600 tideflat) harvested 94,900 marine animals (88,500 shrimp, 5,800 fish, 500 crabs, and 100 miscellaneous invertebrates) in the estuary during the study period. Dungeness crabs and starry flounders were the only identifiable species caught by boat anglers, while the pacific staghorn sculpin and starry floun-ders were the principal fish species caught by shore anglers. Ghost and mud shrimp comprised 93% of the tideflat users harvest. Tideflat users harvested 94% of the total number of animals taken from the estuary. (Schroeder-Wisconsin)

1971 ALSEA RIVER ESTUARY RESOURCE USE STUDY, Oregon Fish Commission, Salem. Div. of Manage

ment and Research.
T. Gaumer, D. Demory, and L. Osis.
Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-10339, \$3.75 in paper copy, \$2.25 in microfiche. Report November 1973. 28 p, 6 fig, 16 tab. DACW 57.72-C-0138, NOAA N208-0073-72(N), NO4-30-208,55

Descriptors: *Estuaries, *Oregon, Fish management, *Fisheries, Crabs, Shrimp, Clams, Eels, Mapping, Invertebrates. Identifiers: *Marine resource map, Resource management, *Alsea River(Ore).

In March - October 1971, the Oregon Fish Commission conducted a comprehensive study of marine food fish, shellfish, and miscellaneous invertebrates, with the exception of anadromous species, in the Alsea River Estuary. The estuary, located 167 miles south of the Columbia River, consists of a 2,146 acre bay with 979 acres of tide-land. During the study 3,401 boat, shore, and tideflat resource users were interviewed to assist in the design of a series of marine resource maps. These maps illustrate the principal boat fishing areas, clambeds, eel grass beds, food production

areas, fish feeding areas, fish migration routes, and known herring spawning areas. Recreational data compiled indicates that 27,500 resource user trips (13,900 boat, 10,000 shore, and 3,600 tideflat) harvested 134,500 animals (55,900 shrimp, 31,400 fish, 23,600 crabs, 23,400 clams, and 200 miscellaneous invertebrates) in the estuary during the study period. Dungeness crabs comprised the majority of the boat anglers' catch; Pacific staghorn sculpin, starry flounder, and shiner perch stagnorn scuipm, starry fronder; and samer perceive the principal shore anglers' catch. Ghost shrimp and cockle and softshell clams were the primary catch of tideflat users. Commercial shellfish landings also accumulated 10,791 pounds valued at \$8,000. (Schroeder-Wisconsin) W75-03346

EXPANSION AND EVALUATION OF AN AR-TIFICIAL REEF OFF MURRELL'S INLET, SOUTH CAROLINA, National Marine Fisheries Service, Beaufort, N.C.

Atlantic Estuarine Fisheries Center.
R. B. Stone, C. C. Buchanan, and R. O. Parker.

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as COM-73-10395, \$4.25 in paper copy, \$2.25 in microfiche. Report CPRC-72009, February 1973. 2 fig, 16 tab,

Descriptors: *Fish management, *Fishing, Fish establishment, *South Carolina, Recreation, Reefs.

Identifiers: *Artificial reef, Paradise Reef(SC), Murrell's Inlet(SC).

In the spring of 1971, local businessmen, the National Marine Fisheries Service, and the South Carolina Marine Resources Division engaged in a cooperative effort to expand and study Paradise Fishing Reef. The expansion phase of the project consisted of assembling and adding over 20,000 scrap tires to the reefsite. A number of studies were conducted to determine the effect of the artificial reef on the distribution and abundance of fish. Migration habits of reef fish were traced IISh. Migration habits of reef IIsh were traced through tagging. Fishing was surveyed by counting private boats leaving the inlet during selected periods, while angler success was surveyed through mail questionnaires. Results indicate the artificial reef has provided a favorable fish habitat. One of the experimental reefs increased fish-carrying capacity 300-1800 times over the prior open bottom. The ten-tire compressed bale proved to be the easiest unit to use in expanding the reef. Catch per angler hour for pelagic fish was higher over the reef but not statistically different from the natural habitat. The reef attracted a number of new anglers (16%) to the area, but future expansion is necessary to accommodate the fishing pressure it receives. (Schroeder-Wisconsin) W75-03348

COMMERCIAL OYSTER FISHERY DEVELOP-MENT INVESTIGATION,

Hawaii State Dept. of Land and Natural Resources, Honolulu.

P. Y. Kawamoto, and H. M. Sakuda

Available from the National Technical Informa-tion Service, Springfield, Va. 22161, as COM-73-11754, \$3.75 in paper copy, \$2.25 in microfiche. Report No NOAA-73090614, May 1973. 37 p, 14 fig, 3 tab, 16 ref. H-2-R and H-13-R.

*Ovsters. *Shellfish farming, Descriptors: Aquiculture, *Hawaii, Fish management, *Commercial shellfish, Biological properties, *Feasibility studies.
Identifiers: West Loch(Hawaii), *Pearl Har-

bor(Hawaii), Oahu(Hawaii), Crassostrea virginica.

Biological factors and aquicultural practices were examined over the 1963-1972 period to determine the feasibility of developing a Hawaiian commer-cial oyster industry utilizing the American oyster, Crassostrea virginica. American oysters used in this study came from West Loch in Pearl Harbor.

Bed samplings were conducted for gonad development. Routine hydrographic and bacteriological observations were also made at study sites. Experimental oysters were also studied in various fish-ponds and tidal areas to determine their viability as growing areas. Results indicate that West Loch oysters reach maturity in two months. Spawning occurs primarily from March through October and 15 months is required to attain commercial sizes. The annual mortality rate was esti-mated at 68.7%. Oysters from West Loch reached commercially acceptable quality in 3 weeks utilizing artificial feeding conditions. Studies of the impact of thermal pollution on oysters indicate that growth is slower in warm water than in the cooler intake water. A serious problem faced by existing West Loch beds was a drastic depletion of the stock due to undetermined causes in 1972 which may require restocking from other areas. (Schroeder-Wisconsin) W75-03350

THE TRANSITION FROM SMALL-SCALE TO

LARGE-SCALE INDUSTRY,
United Nations Development Program, Lagos (Nigeria).

Journal Fisheries Research Board of Canada, Vol. 30, No 12, Pt 2, p 2159-2165, 1973.

Descriptors: *Fisheries, *Fish management, Regional development, Water resources develop-ment, *Economic feasibility, Benefits, Planning. Identifiers: *Developing countries, *Fishing in-

Because general economic growth lags behind improved food production efficiency, developing countries have great incentives to push for large-scale fisheries. Improving the artisanal fisheries productivity is complex, involving improvements of technology, marketing, education, and communications. Provision of the institutions, the infrastructure, capital assistance, and extension of the fishery is also necessary. While these measures can greatly improve the artisanal fishery's produc-tion, they cannot turn it into a large-scale industry in a short period of time. Instead, developing countries have attempted to create a modern, capital-intensive firm co-existing with the artisanal sector. The new sector benefits the old through expansion of the markets, technical adoption, and improvements of the intrastructure. Such benefits are limited, however, unless the new sector ex-ploits new fishery resources. Principal constraints to the new sector are similar to those limiting development of the old: lack of capital; lack of foreign exchange; lack of managerial and technological skills; and lack of an adequate in-frastructure. Several forms of governmental intervention including multilateral and bilateral agreements, joint ventures, and managerial contracts are suggested as means to eliminate the above con-straints. (Schroeder-Wisconsin) W75-03351

ENVIRONMENTAL POLLUTION RAPIDLY GROWING ECONOMY. For primary bibliographic entry see Field 6G. W75-03353

DISTRIBUTIONAL IMPACTS OF ENVIRON-MENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL, New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural

Economics.

For primary bibliographic entry see Field 5G. W75-03354

THE ROLE OF AQUACULTURE IN FISHERY DEVELOPMENT AND MANAGEMENT, Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries. T. V. R. Pillay.

Journal Fisheries Research Board of Canada, Vol 30, No 12, Pt 2, p 2202-2217, 1973. 11 tab, 18 ref.

Descriptors: *Aquiculture, *Fish management, *Mollusks, Cost-benefit analysis, Fish farming, Foods, Regional development, Natural resources, resources development, Return(Monetary). Identifiers: Fishery conservation.

Although aquaculture has had differing developmental patterns throughout the world, it presently represents a viable and growing industry. With world production difficult to assess, FAO statistics indicate that 36 countries produced by culture over three million tons of finfish and one million tons of mollusks in 1970. In the U.S. alone, \$80 million of ornamental fish are imported annually. Presently, aquaculture is used for food production; improvements of natural stocks; production of sportsfish, baitfish, and ornamental fish; fertilizers; and feeds. It also provides a number of jobs, and assists in the improvement of fishery management practices by lessening the strain on the wild stocks through the development of new supply sources. With seed, feed, and labor representing major costs, a summary of a number of cost-benefit studies of several commercial aquaculture firms indicates that government subsidies are not necessary for their development.

Although no world-wide survey has been conducted, it is known that extensive areas are readily available for aquaculture in many developing available for adjacentine in many development countries. Constraints limiting further aquaculture development are lack of adequate planning, financing, and shortage of trained personnel. (Schroeder-Wisconsin) W75-03355

FUTURE OF DESALTING IS BRIGHT BUT

COSTS MUST DROP, Water and Wastes Engineering, New York. For primary bibliographic entry see Field 3A. W75-03356

DETERMINING AN EQUITABLE SURCHARGE FOR INDUSTRIAL WASTES,

Gilbert Associates, Inc., Reading, Pa For primary bibliographic entry see Field 5G. W75-03397

MERCURY,

Bureau of Mines, Washington, D.C. Div. of Non-ferrous Metals.

V. A. Cammarota, Jr.

Available from Superintendent of Documents, Washington, DC 20402, for \$0.25 per copy. In: 1972 Bureau of Mines Minerals Yearbook, US Government Printing Office, Washington, DC, 1972, 11 p. 1 fig, 13 tab, 18 ref.

Descriptors: *Mercury, *Legislation, Regulation, *Toxicity, Water pollution, Federal Water Pollution Control Act, Pollutants, Mining, Heavy metals, Organic compounds, Inorganic compounds, Public health, Industrial wastes, Water pollution sources.

A general overview of mercury covers the areas of legislation and government programs, domestic production, consumption and uses, prices, foreign trade, a world review of mercury, and recent technology. Because of restrictions on the use of mercury in certain industrial processes imposed by the EPA, sales and prices of mercury dropped to a new low in 1972, and many mines were closed or partially closed. However, consumption in 1972 was 1% higher than in 1971. Increased consumption was noted for agriculture, dental prepara-tions, and industrial and control instruments. Electrical apparatus, down 8%, showed the largest decline of the major uses, mainly because of a fall in consumption for batteries. Mercury exports decreased significantly to 400 flasks from 7232 flasks in 1971. Because of the concern over the level of mercury in the environment, available

data on mercury content in rocks, ores, minerals, soil, water and plants were compiled with a view toward elucidating the role of natural processes in releasing mercury to the environment. A process was developed to remove mercury from the sulfuric acid produced from roasting zinc ores, and a method of determining traces of mercury in liquids, sensitive to about 1 part per billion, was developed. (Jernigan-Vanderbilt) W75-03797

LONG TERM INVESTMENT CONSIDERA-TIONS OF CONJUNCTIVE DESALTING DESALTING

California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W75-03807

6D. Water Demand

FACTORS INFLUENCING PARTICIPATION IN RECREATION ACTIVITIES IN SOUTHEAST IOWA, AND CAMPER ATTENDANCE AT MACBRIDE STATE PARK,

Iowa Univ., Iowa City. Recreation Education Pro-

For primary bibliographic entry see Field 6B. W75-03317

A NOTE ON THE EVALUATION OF ACTIVITY DEPENDENT RECREATIONAL DAMAGE COST FUNCTIONS.

Texas Univ., Austin. Dept. of Chemical Engineer-

M. Bundgaard-Nielsen, and D. M. Himmelblau. Water Resources Bulletin, Vol 10, No 3, p 580-585, 1974. 2 fig, 5 ref.

Descriptors: Recreation, *Water resources development, *Recreation demand, Water quality, Planning, *Costs, *Evaluation, *Benefits.

Determination of recreation benefits arising from improved water quality is an important aspect of water resources management. To develop the functional relationship three steps must be undertaken: identify the form of the function; estimate the coefficients of the functions through nonlinear estimation; and validate the function. Several approaches to developing recreational functions for water quality have been utilized. In the first, using attitude surveys, recreationists' perceptions of water quality are surveyed. Information from such surveys is generally difficult to relate to quantitative water quality factors, although they do isolate quality characteristics important to the public. A second postulates demand over supply functions for water quality, but dif-ficulties in functional form and data generally limit such studies to qualitative interests. A third approach classifies benefits from water quality arising from water based activities requiring certain minimum water quality, but independent other-wise, and water based activities which rise proportionately to improved quality. Such an approach envisions a family of recreation functions. Estimation of coefficients under this approach can be facilitated through factual information on the physical characteristics of the water system comonicu with socio-economic investigations and/or subjective assessments of the specific recreation activity's value to yield a quantitative functional form. (Schroeder-Wisconsin) W75-03341 bined with socio-economic investigations and/or

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION, Oak Ridge National Lab., Tenn.

E. Hirst, and T. Healy.

Available from the National Technical Inform tion Service, Springfield, Va. 22161, as CONF-730205-4, \$4.00 in paper copy, \$2.25 in microfiche.

Presented at the Conference on Energy: Demand, Conservation and Institutional Problems, Massachusetts Institute of Technology, Cambridge, February 12-14, 1973. 20 p, 1 fig, 4 tab, 36 ref.

*Electric Descriptors: power *Pollution abatement, *Energy, Electric power

production.
Identifiers: Electric mass transit, Solid waste disposal, Air pollution control, Waste heat dissipation, Electricity conservation.

Potential energy savings or expenditures resulting from six environmental quality strategies--electric mass transit, waste water treatment, solid waste disposal, air pollution control, waste heat dissipation, and electricity conservation-are sum-marized. Increased utilization of urban electric mass transit to 10% of the 1970 urban auto traffic; primary-secondary treatment of all 1970 waste water; 100% of incineration of 1970 solid waste (collection, transportation, and land filling having little electricity consumption); air pollution controls utilizing electrostatic precipitators and limestone scrubbers; and waste heat dissipation using cooling towers at power stations would result in increased energy consumption of 21, 25, 5, 39, and 14 billion KW hr/year respectively. Two strategies to handle solid waste are examined as methods to reduce total electricity consumption and adverse environmental effects of power production. Incineration to generate electricity or recycling of solid wastes could have reduced energy consumption in 1970 by 25 and 23 billion KW hr/year. Shifts in home heating to gas, increased insulation, and utilization of more energy-efficient air conditioners could also have reduced energy consumption by 60 billion KW hr/year. Energy costs of construction of such systems are not discussed. (Schroeder-Wisconsin)

EAST BRIMFIELD AND WESTVILLE RESERVOIRS. QUANTITY AND VALUE OF WATER SUPPLY STORAGE. QUINEBAUG RIVERMASSACHUSETTS.

Public Health Service, New York.

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as AD-778 564, \$3.75 in paper copy, \$2.25 in microfiche. July 1959, 23 p, 4 tab, 1 fig.

Descriptors: *Water sources, *Water resources, Water supply, "Water demand, "Massachusetts, Storage, Water storage, Reclaimed water, Water reuse, Resources, Water quality, Watershed management, "Management, Water utilization, reuse, Resources, Water quality, Watershed management, *Management, Water utilization, Water yield, Water yield improvement, Supply, Water policy, Resources development, Watersheds(Basins), Potential water supply, Elec-tric power, Electric power demand, Utilities,

*Quinebaug I Identifiers: River(Mass). *Southbridge(Mass), *Hatchet Brook watershed(Mass), *East Brimfield Dam(Mass), Westville Dam(Mass).

Two major water sources available to Southbridge, Massachusetts, are the Hatchet Brook watershed which furnishes 1.3 MGD and the Quinebaug River which provides 9.8 MGD of reclaimed industrial water. The Southbridge Water Supply Company will need additional water since future demand exceeds the safe yield of the existing system. These requirements probably can be best served by developing the Breakneck Brook watershed rather than from storage on the Quinebaug River. However, Southbridge's major industrial water users depend on water from that river and require storage. The value of supplying a minimum flow in the Quinebaug River of 22 cfs from the East Brimfield Dam and Reservoir was investigated in terms of costs of alternate sir purpose water supply reservoirs and the cost of electric power that may be purchased to substitute

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for power generated in existing steam plants. The latter method of evaluation gave the lowest reasonable value for the assured flow. Cost of substituting electric power in maintaining a minimum flow of 22 cfs in the Quinebaug River is \$7,400 per year. The present worth of \$7,400 annually for 50 years at 4 per cent interest is \$159,000. (Grden-North Carolina) W75-03437

6E. Water Law and Institutions

DISTRIBUTIONAL IMPACTS OF ENVIRON-MENTAL MANAGEMENT: FEDERAL GRANTS FOR WATER POLLUTION CONTROL, New York State Coll. of Agriculture and Life Sciences, Ithaca. Dept. of Agricultural For primary bibliographic entry see Field 5G. W75-03354

STUDY AND SURVEY OF LAKE MICHIGAN SHORE LINE, Smith and Hurd Annotated, Ch 19, secs 1141-1146,

p 35-36 (Supp 1973). (Illinois).

Descriptors: *Erosion control, *Lake Michigan, *Illinois, *Administrative agencies, *Coordination, *Public health, Safety, Federal government, Local governments, Adoption of practices, Administration, Economic aspects, Research, Shoreline, Inter-agency cooperation, Water resources development, Evaluation, Land management, Water face runoff, Erosion. Water management(Applied), Sur-

Identifiers: Administrative regulations, Environmental policy, State policy.

The Illinois Division of Water Resource Management of the Department of Transportation in coor-dination with federal and local agencies will study and devise means of preventing erosion of the shore of Lake Michigan. An attempt will be made to prevent or minimize, in the immediate future. damage to homes and other buildings and danger to human life resulting from such erosion. Agreements between cooperating agencies, organizations, and individuals may be made to assign specific projects, phases of particular projects, as well as joint undertakings and contributions of funds. The Division of Water Resource Management will work with the federal government to evaluate the influence of the construction at the Great Lakes Naval Training Facility upon the southerly movement of littoral material along the west shore of Lake Michigan. No contract may be entered into for any expenditure of funds ap-propriated and made available to implement and carry out this legislation without the prior written approval of the Governor. (Sperling-Florida) W75-03357

UNITED STATES V. CHESAPEAKE AND DELAWARE SHIPYARD, INC. (SUIT BY GOVERNMENT TO RECOVER UNDER THE 'WRECK ACT'). 369 F Supp 714 (DC Md 1974).

Descriptors: "Maryland, "Judicial decisions, "Rivers and Harbors Act, "Neglience, "Navigable waters, Legal aspects, Water law, Legislation, Navigation, Canals, Channels, Inland waterways, Non-consumptive use, Water policy, Federal government, Common law, Law enforcement, Non-structural alternatives, Damages, Administrative agencies, Administration, Adjudication procedure. procedure.
Identifiers: Navigation obstructions, Presump-

The United States, pursuant to section 409 of the Rivers and Harbors Act, the 'Wreck Act' sued the defendant corporation to recover costs incurred in raising and removing the defendant's barge from a navigable channel of the Chesapeake and Delaware Canal. The barge had been intentionally sunk and moored by employees of the defendant.

One evening the barge inexplicably broke its moorings and settled in the channel. When asked moorings and settled in the channel. When asked to remove the barge, the defendant's president refused, stating that it was abandoning the barge. The Corps of Engineers subsequently removed the barge. The government asserted that the sunken barge was a 'vessel' under the Wreck Act and that under the doctrine of res ipsa loquitur the defendant was held negligent and therefore liable under the Act. The U.S. District Court of Maryland sustained the government and held that the defen-dant failed to overcome the inference of negligence under res ipsa loquitur. The court ruled that where a vessel sinks in a navigable waterway due to owner's negligence, thereby creating an ob struction to navigation, the owner may not shift the burden of removing the vessel to the govern-ment by abandoning the vessel. Judgment was for the government. (Deckert-Florida)

SCHINE ENTERPRISES, INC. V. ASKEW (DECLARATORY JUDGMENT ACTION CONCERNING FLORIDA INLAND NAVIGATION DISTRICT). 291 So 2d 130 (1st D C A Fla 1974).

*Judicial decisions, *Florida. Descriptors: administration, *Legislation, *Contract administration, *Legislation, *Claims(Contracts), Legal aspects, Water law, Legal review, Equity, State jurisdiction, State governments, Administrative agencies, Water resources development, Constitutional law, Water policy, Comprehensive planning, Inland waterways, Conservation, Recreation, Area redevelop-ment, Land tenure, Contracts, Land development,

Land management.
Identifiers: Declaratory judgments, State policy,
Coastal waters, *Coastal zone management.

Plaintiff corporation sought a declaratory judgment as to its rights under a contract which its predicessor had entered into with the Florida In-land Navigation District, a state agency. The con-tract concerned a parcel of property through which the Intercoastal Waterway ran. The contract was an option agreement giving the plaintiff the right to 'meet and match' any satisfactory the right to meet and match any saustactory purchase offers respecting the property. The plaintiff contended that a dedication of the land to another state agency, made pursuant to a state statute directing development of the property for recreation and conservation purposes, violated the agreement and that the authorizing statute agreement and that the authorizing statute deprived it of property without due process of law. The trial court ruled in favor of the defendants, and the plaintiff appealed. The District Court of Appeal of Florida, affirming the lower court, ruled that the plaintiff's contract right was in the nature of a trieb of first extraction. of a right of first refusal' contingent upon receipt by the District of a satisfactory offer to purchase from a third party. It further held that the dedication agreement was not a transfer within the mean-ing of the contract, and thus the plaintiff's contractual rights were not impaired. (Deckert-Florida)

CANAL AUTHORITY OF STATE OF FLORIDA V. CALLAWAY (INJUNCTION TO STOP CON-STRUCTION). 489 F 2d 567 (5th Cir Fla 1974).

*Florida, *Judicial decisions, al effects, *Canal construction, Descriptors: Environmental effects, *Inland waterways, Federal government, State governments, Federal jurisdiction, Water managegovernments, Federal jurisdiction, Water manage-ment(Applied), Legal aspects, Governmental in-terrelations, Political aspects, Water law, Flood-ing, Federal-state water rights conflicts, Ecology, Impoundments, Lakes, Multi-purpose reservoirs, Legal review, Administration, Rivers, Post-im-poundment, Administrative decisions, Recreation, Adjudication procedure, Administrative agencies. Identifiers: Injunctive relief. Presumptions(Legal), Dam effects, National Environmen-

The plaintiffs, a state canal authority and others, sought an injunction against several federal agencies to prevent the termination of the Cross Florida Barge Canal project, and also requested a preliminary injunction preventing the proposed drawdown of Lake Ocklawaha which had been created as part of the canal project. The plaintiffs contended that the drawdown would result in the loss of recreational use of the lake, loss of tourism, and alteration of the lake ecology. The defendants argued that creation of the lake had already damaged the original tree swamp ecology of the Ocklawaha Valley and that continued maintenance of the lake would result in the permanent destruction of the Ocklawaha Valley. A federal district court in Florida granted the injunction. When sub-sequent attempts to have the injunction lifted failed, and defendants appealed. The Fifth Circuit Court of Appeals held that the district court erred in placing the burden on the defendants to prove that their interests would suffer irreparable harm if the preliminary injunction was granted. The appellate court ruled that the burden of persuasion was at all times upon the plaintiffs and instructed the lower court to re-examine its order under the proper standards and without delay. (Deckert-Florida) W75-03360

ENVIRONMENTAL DEFENSE FUND, INC. V. CORPS OF ENGINEERS OF THE UNITED STATES ARMY (ACTION TO RESTRAIN CORPS FROM FURTHER CONSTRUCTION OF NAVIGATION PROJECT). 492 F 2d 1123 (5th Cir 1974).

Descriptors: *Judicial decisions, *Federal jurisdiction, *Environmental effects, *Inland waterways, *Canal construction, Canals, Mississippi, Tenne see, Alabama, Water management(Applied), Ecology, Federal government, Administrative agencies, Federal project policy, Project planning, Engineering structures, Legal aspects, Water law, Legal review, Navigation, Rivers, Navigable waters, Administrative decisions, Project benefits, Project purposes, Adjudication

Identifiers: Injunctive relief, *Environmental impact statement, National Environmental Policy Act, Private interest groups.

Certain individuals and environmental groups sought an injunction against the Army Corps of Engineers and others to halt construction of the Tennessee-Tombigbee Waterway. The project was authorized prior to passage of the National Environmental Policy Act of 1969. Work on the project was halted by a preliminary injunction issued in 1971 by the federal district court for the District of Columbia, and the action was transferred to a federal district court in Mississippi. That court dismissed the complaint and dissolved the preliminary injunction. Construction has been underway nary injunction. Construction has ocen underway since that dissolution. The plaintiffs contended that the Corps had failed to adequately consider environmental factors in its planning decisions and thus had not complied with the requirements of the NEPA. On appeal from the dismissal, the Fifth Circuit Court of Appeals ruled that an environmental impact statement prepared by the Corps complied with the NEPA requirements, and afed the lower courts ruling. The court further held that, although it had authority to review sub-stantive agency decisions concerning environmen-tally controversial projects, Congress itself, by appropriating funds for this project after considera-tion of its environmental impact, had supplanted the Corps' decision and had thereby precluded such review. (Dekert-Florida) such review W75-03361

ENVIRONMENTAL DEFENSE FUND V. TEN-NESSEE VALLEY AUTHORITY (ACTION TO ENJOIN TVA FROM COMPLETING CON-STRUCTION OF TELLICO DAM). 492 F 2d 466 (6th Cir 1973).

Descriptors: *Tennessee, *Judicial decisions, *Environmental effects, *Tennessee Valley Authority, *Adjudication procedure, Multiple-Authonty, 'Adjudication procedure, Multiple purpose projects, Rivers, Federal jurisdiction, Legal aspects, Legislation, Law enforcement, Dam construction, Impoundments, Flooding, Water management(Applied), Water law, Legal review, River basin development, Water supply, Watershed management, Multiple-purpose reserving Exchangement, Multiple-purpose reserving.

waterstet management, Mutuple-purpose reservoirs, Federal government, Flood control, Recreation, Hydroelectric power.
Identifiers: Dam effects, *Environmental impact statement, Injunctive relief, National Environmental Policy Act, FWPCA Amendments of 1972, Environmental policy, Private interest groups.

An appeal was made from a Federal District Court decision dissolving a preliminary injunction and granting judgment for the defendant. The plaintiff environmental group sought to enjoin the defendant federal agency from completing construction of the Tellico Dam Project. This sixty-nine million of the Tellico Dam Project. This sixty-nine milliod dollar project admittedly would entail considera-ble ecological damage. The lower court granted a preliminary injunction on the finding that the de-fendant had not complied with the National En-vironmental Policy Act by filing an adequate im-pact statement. This preliminary injunction was upheld on appeal. After a hearing on the merits and consideration of the final impact statement, the district court dissolved the injunction and rejected the contention that the project was in viola-tion of the N.E.P.A., or any other federal laws. The Sixth Circuit Court of Appeals affirmed, and held that the district court correctly applied the proper balancing test between ecological damage and economic and social benefits. The court also held that the N.E.P.A. did not require perfection, and that in assessing the adequacy of impact state-ments, practicability and reasonableness are to be considered along with the broad purpose of the Act. (Deckert-Florida) W75-03362

THE INFLUENCE OF RECENT TRENDS IN WATER LEGISLATION ON THE STRUCTURE AND FUNCTIONS OF WATER ADMINISTRA-

TION, Fordham Univ., Bronx, N.Y. School of Law.

L. A. Teclaff.

Land and Water Law Review, Vol 9, No 1, p 1-19, 1974. 77 ref.

Descriptors: *River basin commissions, *River basin development, *Interstate commissions, *Comprehensive planning, *Water resources development, Governments, Water supply development, Water policy, Water law, Legislation, Local governments, Water pollution, Water pollution control, Water supply, Federal government, Water utilization, Water conservation, Water supply, Federal government, Water utilization, Water conservation, ponution control, water supply, request govern ment, Water utilization, Water conservation Water quality control, Adoption of practices. Identifiers: *International agreements, Wate rights(Non-riparians), Administrative regulations.

Common trends are developing internationally in water legislation. The common increasing demand for water means common problems of regulation. From conferences such as the International Conference on Water for Peace, 1968, a large body of data on water law and administration has become available. The common trends are most clearly manifest in the legalizing of the river basin as the basis for cooperation between states. International commissions of the Nile, Indus, and La Plata have authority only to advise and supervise the execution of previously approved water works. These commissions are more influential upon national water development than upon international cooperation. Both the Niger treaty and the 1972 Ramsar convention were concerned with detrimental effects of water development on other-elements of the environment. On a world-wide scale, consolidation of water administration, preferably independent of existing agencies, is taking place very slowly. Recent water law tends to extend administrative control over all water uses. The goal is to co-ordinate the water control activities of a series of river basin agencies under one national water control agency. (Dillingham-Florida) W75-03363

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT, McBurney, Musolf and Whipple, Madison, Wis.

Marquette Law Review, Vol 57, p 25-38, 1973. 85

Descriptors: *Wisconsin, *Judicial decisions, *Riparian rights, *Zoning, *Water pollution, Legal aspects, Navigable waters, Lakes, Navigable rivers, Flood plains, Water quality control, Water quality, State jurisdiction, Land use, Watersheds(Basins), Land management, Riparian land, Water pollution control, Water policy, Water law, Water management(Applied), Water allocation(Policy), Environmental effects. Identifiers: Private interest groups, Public trust doctrine, Water rights(Non-riparians), State policy.

An important dimension has been added to zoning variance or amendment application procedure for all land either exhibiting or in proximity of navigable waters in Wisconsin. The uses made of land adjacent to water bodies and in flood plains and watersheds affect water quality. The Wisconsin Supreme Court established the state's right as trustee of shorelands to restrict private land use for water quality protection. This trusteeship when considered in light of the Shoreland Zoning Act, places the Department of Natural Resources
(DNR) in the role of an interested person within the mandatory notice provision of municipal and county zoning statutes. Notice of application for a zoning variance as a condition precedent to establishing the jurisdiction of the board of review must be given to the DNR. Failure to do so will render void any action taken by the board of review. (Dillingham-Florida) W75-03364

ENVIRONMENTAL LAW-OIL POLLUTION CONTROL-IN THE ABSENCE OF FEDERAL PREEMPTION AND ANY FATAL CONFLICT BETWEEN STATUTORY SCHEMES, A STATE MAY CONSTITUTIONALLY EXERCISE ITS POLICE POWER TO PROVIDE FOR CLEANUY OF OIL SPILLAGE AND FOR RECOUPEMENT OF COSTS CONCURRENTLY WITH THE FEDERAL COMPANIENT FEDERAL GOVERNMENT,
For primary bibliographic entry see Field 5G.
W75-03365

U.S. CHECKING UP ON FIRMS' SPILL-PREVENTION, CLEANUP PLANS. For primary bibliographic entry see Field 5G. W75-03373

RECONCILING CONFLICTS AMONG DIF-FERENT ECONOMIC INTEREST GROUPS IN THE MANAGEMENT OF FISHERIES, Fisheries and Marine Service, Ottawa (Ontario). For primary bibliographic entry see Field 6B. W75-03392

A SURVEY OF INTERNATIONAL CUSTOMARY RULES OF ENVIRONMENTAL PROTEC-

TION, Wadham Coll., Oxford (England). For primary bibliographic entry see Field 5G.

W75-03453

FISHERY PROPOSALS IN THE UNITED NA-TIONS SEABED COMMITTEE: AN EVALUA-

Utrecht Rijksuniversiteit (Netherlands). Inst. of Public International Law. A. W. Koers.

Journal of Maritime Law and Commerce, Vol 5, No 2, p 183-209, January 1974. 145 ref.

Descriptors: *United Nations, *Organizations, *Fisheries, *Fish management, *International law, *Commercial fishing, *International waters, Foreign trade, Aspects, Law of the sea, Fish constitution Fish propulations, Fish servation, Fish migration, Fish populations, Fish types, Research.
Identifiers: *Resource allocation, *International

agreements, *Coastal zone management, *Territorial waters, *Territorial seas(Jurisdiction).

The developed international law of marine fisheries deals with five major problem areas: allocation of marine fisheries resources among the nations of the world; prevention of the exploitation of the living resources of the sea from exceeding biological regenerative potential; full use of the resources; inplementation of economic efficiency of marine fishing operations; and research. Proposals submitted to the United Nations Seabed Committee to deal with these problems are examined. The most important factor in determining the allocation of fishery resources is the width coastal nations have established for execlusive fishery waters. The objective of most international fisheries agreements and organizations to facilitate conservation is to limit the catch of fishery stocks. Effective conservation measures have been applied to only a small number of fishes. The degree of utilization of specific stock should be deter-mined by economic factors. Overcapitalization occurs in most commercially attractive high fisheries due partly to non-regulation of fishing operations on the high seas. Research requires international cooperation. Proposals of Kenya, Australia, and New Zealand, Canada, Soviet Union and the United States to deal with fishery problems are included. The respective projects are evaluated by their local and international effects. (Sperling-Florida) W75-03454

MOSS ROSE MANUFACTURING CO. V. FOSTER (ACTION FOR RECOVERY OF WATER DAMAGE CAUSED BY SEEPAGE). 314 A.2d 25 (1974).

Descriptors: *Pennsylvania, *Judicial decisions, *Water storage, *Cisterns, *Seepage, Storage tanks, Water tanks, Water control, Seepage contrinis, water tains, water control, seepage control, Negligence, Damages, Percolation, Ground-water movement, Percolating water, Subsurface drainage, Adjudication procedure.

Identifiers: Absolute liability, Water rights(Non-

Appeal was made to the Superior Court of Pennsylvania from a judgment for the plaintiff-appellee for property damage caused by water seepage from appellants' underground cistern. The parties in this action were manufacturing compa-nies located adjacent to each other. Appellants maintained a large cistern below the basement of their premises. It overflowed and the water perco-lated through the soil column and, seeping into the appellee's basement caused considerable property damage to plaintiff's property. Appellants contend that there was insufficient evidence to support a finding of negligence. Appellees contend that their neighbors are liable on negligence principles for failing to reasonably maintain the cistern. The lower court found appellants liable for negligently maintaining the cistern and on a theory of absolute liability of the landowner. The Superior Court affirmed the negligence count and declined to rule on the absolute liability. (Dillingham-Florida) W75-03455

Group 6E—Water Law and Institutions

PEOPLE V. OCEANA TERMINAL CORP. (PROSECUTION FOR AN OIL SPILL). 352 N.Y.S.2d 818 (1974).

Descriptors: *New York, *Judicial decisions, *Oil spills, *Water pollution sources, *Enforcement, Oil industry, Oil pollution, Legislation, Navigable waters, Water pollution, Water law, Civil law. Storage tanks, Water quality control, Waste disposal, Local governments, Water pollution control, Adjudication procedure, Water rights, Administrative agencies, Adoption of practices, Administrative decisions, Environmental effects, Legal aspects.

Identifiers: *Hazardous substances(Pollution).

An oil storage terminal company was prosecuted for an oil spill. The prosecution alleged that the spill violated the statute proscribing the disposal of offensive matter into navigable waters. The spill occurred when an 8-inch check valve with no prior indicated defect broke at the terminal, leaking a large quantity of oil into the river. The trouble point had been inspected only 20 minutes before the break occurred. The whole system was constantly under surveillance. The prosecution contended that the spill was within the purview of a statute intended to punish the dumping of garbage and like wastes and that terminal owners were civilly liable. The defendants were willing to plead guilty but the court dismissed the case. The court held that the statute proscribing the disposal of waste matter into the river was not intended to include oil spills and that the defendants could not be held civilly liable for environmental damage caused when pipes suddenly break without prior indicated defect. (Dillingham-Florida)

MCCALL V. PRESLEY (SEEKING MANDAMUS FOR ISSUANCE OF BUILDING PERMIT). 512 S.W.2d 693 (Tex App 1974).

Descriptors: *Texas, *Judicial decisions, *Legal aspects, *Regulation, *Water supply, *Construction, Permit, Land tenure, Municipalities, Administrative agencies, Decision making, Adoption of practices, Conduit, Water distribution(Applied), Water shortage, Water system, Administration, Planning, Equity, Adjudication procedure, Water allocation(Policy), Water management(Applied), Comprehensive planning. Identifiers: *Injunctive relief.

Property owners sought a writ of mandamus requiring the issuance of a building permit. The district court rendered a judgment in favor of the property owners. On appeal the city prevailed. The court held there was not enough water to supply a house which the owners proposed to build. There was also no water line sufficient to provide fire protection for the proposed house. This reversal on appeal was in accordance with the decision of the city board of appeals which denied the permit, notwithstanding an arrangement whereby a neighbor had given owners permission to connect the water facilities of the proposed house to the neighbor's line which was connected with the city water system. Orders of the water commission are presumed legal and valid and the burden is on the party appealing from the order of the commission to show that the order is not reasonably supported by substantial evidence. (Sperling-Florida) W75-03457

PERSPECTIVES ON COASTAL MANAGE-MENT-MARINE TRADES AND THE COASTAL

Rhode Island Univ., Kingston. Coastal Resources Center.

For primary bibliographic entry see Field 6B.

W75-03458

PEOPLE EX REL GAZLAY V. MURRAY (ACTION TO ENJOIN FILLING PARCEL OF SUBMERGED LAND). 221 N.W.2d 604 (Ct App Mich August 13, 1974).

Descriptors: *Land tenure, *Federal government, *Michigan, *Administrative agencies, *Legal aspects, *Submerged lands, Beds, Bay, Meanders, ownership of beds, State governments, Land reclamation, Land use, Land development, Real property, Conservation, Natural resources, Water law, Accretion(Legal aspects), Boundaries(Property). Identifiers: Fill permits.

Action was brought by the Michigan Department of Natural Resources to enjoin the defendant from filling a parcel of submerged land located in Mallard Bay. The circuit court found that the defendant's federal land patent covered neither the Bay nor the land claimed. The court of appeals held that unless the land in question was transfered by the federal government by patent prior to Michigan's admission to the Union, the land in question belonged to the people of the state. The court also held the patent did not cover the land in question, that the state was not estopped from claiming title to the land because it approved the supervisor's plat which contained part of the land in question, and that the Marketable Record Title Act doesn't apply against the state. The federal government did not patent land by entire sections where the section was cut off by navigable water, but only conveyed fractional parts up to a meander line or at most to the water's edge. (Sperling-Florida) W75-03460

PACIFIC NORTHWEST BELL TELEPHONE CO. V. U.S. (ACTION SEEKING DAMAGES FOR DAMAGE TO SUBMARINE TELEPHONE CABLE).

378 F Supp 297 (WD Wash, July 9, 1974).

Descriptors: *Judicial decisions, United States, *Legal aspects, *Legislation, *Permits, Economic aspects, Washington, Navigation, Ships, Decision aspects, washington, Navigation, Ships, Decision making, Conservation, Admiralty, Adoption of practices, Jurisdiction, Lakes, Planning, Federal government, Adjudication procedure. Identifiers: Liability(Legal aspects), Immunity(Legal aspects), Sovereign immunity.

Action was brought by the Pacific Northwest Bell Telephone Company against the United States of America in the Western District of Washington. The company alleged damage to a submarine telephone cable allegedly caused by the negligence of the United States Coast Guard. There was a clause in the permit to lay submarine telephone cable in navigable waters of the lake, which attempted to immunize the United States from liability from future navigation, conservation or improvement operations. The court held the clause to be invalid, both under the Public Vessels Act, and under the 1960 amendments to the Suits in Admiralty Act. These acts were designed to subject the United States to maritime tort liability to the not immunize the United States from liability to the same extent as private persons, so the clause could not immunize the United States from liability for alleged negligence in causing damage to a cable. (Sperling-Florida) W75-03461

UNITED STATES V. RAVEN (APPEAL FROM CONVICTION FOR FAILING TO REMOVE SUNKEN VESSEL AND OBSTRUCTING NAVIGABLE WATERWAY). 500 F 2d 728 (US Ct Ap, 5th Cir 1974).

Descriptors: *Florida, United States, *Rivers and Harbors Act, *Judicial decisions, *Navigable waters, Ships, Vessels, Legislation, Safety, Public health, Environmental sanitation, Legal aspects, Channel, Adoption of practices, Decision-making, River, Bodies of water, Water law, Adjudication

Identifiers: Navigational obstruction, Liability(Legal aspects), Injunctive relief, Information(Prosecution).

An appeal was made of a conviction, in Florida, for failing to properly mark a sunken vessel, obstructing a navigable waterway, and failing to remove a sunken vessel. The court held that the legislation prohibiting obstruction of navigable waters generally applied to a sunken vessel. The Rivers and Harbors Appropriation Act of 1899 prohibited obstruction of navigable waters by vessels. sels. However, this statute is not limited to those vessels that are sunk as the result of wrecks, but extends to derelicts sunk from other causes. If violating this statute requires a deliberate act then proof that the vessel after being severely damaged in a storm was left in a river for three months was sufficient to show a deliberate act. The purpose of the statute, requiring sunken vessels to be marked and removed in a navigable channel is the protection of other vessels plying the same waters. (Sperling-Florida) W75-03462

JACKSON V. TEXAS WATER RIGHTS COM-MISSION (SUIT SEEKING CANCELLATION OF COMM'N. ORDERS DESIGNATING UN-DERGROUND WATER CONSERVATION DIS-TRICT).

512 SW 2d 696 (Tex App 1974).

Descriptors: *Texas, *Judicial decisions, *Legal aspects, *Water conservation, *Administration, aspects, "Water conservation, "Administration, Administrative agencies, Adoption of practices, Planning, Groundwater, Legislation, Decision making, Regulation, Political subdivisions, Water resources, Water resources development, Com-prehensive planning, Enforcement, Conservation, Adjudication procedure.

Identifiers: Administrative regulations, State pol-*Environmental policy, Liability(Legal

Action was brought seeking the cancellation of or-ders of the Texas Water Rights Commission designating an underground water conservation district. The lower court held against the plaintiffs. On appeal it was held the suit was moot in that the orders were cancelled when an election refused to confirm the district. The Court of Civil Appeals is not empowered to write advisory opinions. Section 51.034(a) of the Texas Water Code provides that if the majority of those voting at an election vote in favor of the confirmation of the district, the district is confirmed and ratified. However, if the majority of those voting at the election vote against the confirmation of the district, the district shall have no further authority, except that any debts incurred shall be paid and the organization of the district shall be maintained until all the debts are paid. (Sperling-Florida) W75-03463

A. H. SMITH SAND AND GRAVEL CO. V. DEPT. OF WATER RESOURCES (ACTION DEALING WITH FILLING OPERATIONS IN FLOODPLAIN).
313 A 2d 820 (Md App 1974).

Descriptors: *Maryland, *Judicial decisions, *Flood plain, *Flood plain zoning, *Flood control, Deposition(Sediments), Floods, Non-structural alternatives, Eminent domain, State jurisdiction, Legal aspects, Administrative agencies, Water pollution control, Pollution abatement, Industrial effluents, Industrial wastes, Sedimentation, Administrative decisions. Identifiers: Administrative regulations.

Appeal was made by a sand and gravel company rom a Circuit Court order which affirmed the order of the Maryland Department of Water Resources (DWR) requiring that no filling operations should take place on appellant's land which is situated within a fifty-year flood plain. The court modified DWR's order by redefining the boundaries of the floodplain established by DWR. DWR had appropriated a portion of appellant's land for flood control purposes. Appellant con-tended that this action constituted an unreasonable restriction upon the use of its property. DWR argued the appropriation was necessary for flood control. The Court of Appeals held that the order did not deny the appellant all reasonable use of its property within compensation. The redetermina-tion of the floodplain boundaries was warranted because new information indicated flood periodicity was less than 50 years. The Circuit Court's decision was affirmed. (Dillingham-W75-03464

COMMONWEALTH V. BOROUGH OF GALETON (PETITION TO ENFORCE CLEAN STREAMS LAW).

Descriptors: *Pennsylvania, *Judicial decisions, *Law enforcement, *Penalties(Legal), *Water quality control, State governments, Administrative agencies, Local governments, Legislation, Water law, Legal aspects, Management, Legal review, Regulation, Governmental interrelations, Non-structural alternatives, Water resources development, Water policy, Adjudication procedure, Water pollution control, Municipal wastes, Local governments. Identifiers: State policy.

Petitioner Pennsylvania state agency brought action seeking enforcement of an order issued pur-suant to the Clean Streams Law (CSL) and asking that the respondents, the borough and named public officials thereof, be adjudged in contempt pursuant to that law. The respondents filed a mo-tion to strike for petitioner's failure to name all those officials in office at the time the petition was filed. The petition named those individuals in of-fice at the time the original department order was issued. The Commonwealth Court found that the dominant purpose of the contempt procedure under the Clean Streams Law is remedial in nature, as a means of coercing local authorities into compliance. Accordingly, the court ruled that the petitioner must include in its petition all those persons who are members of the concerned local governing body or bodies at the time of the filing of the petition, but need not include former public officials. The petition was dismissed with leave to amend. (Deckert-Florida) W75-03465

IN RE BARKER SARGENT CORP (APPEAL FROM ENVIRONMENTAL BOARD DECISION). 313 A 2d 669 (Vt 1973).

Descriptors: *Judicial decisions, *Land use, *Landfills, *Sanitary engineering, *Environmental effects, Environmental sanitation, Environmental engineering, Land development, Land management, Air pollution, Aesthetics, Noise pollution, Administrative agencies, "Vermont, Land use, Permits, Public rights, Public benefits, Legal aspects, Administrative decisions, Social aspects, Wildlife, Wildlife conservation, Conservation. Identifiers: Administrative regulations, State policy, Licenses, Nuisance(Legal aspects).

An appeal was made by adjacent landowners from an administrative decision of the Vermont Environmental Board granting a land use permit to a sanitary landfill in the town of Thetford. In evaluating the validity of the issuance of the land use permit, the court examined the applicable sections of the state statute. The statute provides that the town must show that undue air or water pollu-tion will not result before granting the permit. The appellant argues that the Board was in error in finding that the proposed landfill would not create air pollution. Appellants contend that air pollution can be caused by the creation of noise, and that such noise would be created by development of the landfill. Appellants asserted that wildlife and local scenery would suffer. Appellee argued that any adverse wildlife and visual effects would be minimal, and noise would be subdued. The court sustained the ruling of the Environmental Board concluding that it is necessary to place sanitary landfills somewhere, and merely offending the feelings of adjacent landowners has no validity. (Sperling-Florida) W75-03466

CAPPTURE REALTY CORP. V. BOARD OF AD-JUSTMENT (SUIT CHALLENGING DENIAL OF SPECIAL EXCEPTION USE-CONSTRUCTION IN FLOOD PLAINS). 313 A 2d 624 (1973).

Descriptors: *New Jersey, *Flood plains, *Flood plain zoning, *Flood control, *Judicial decisions, Zoning, Flood protection, Streams, Civil engineering, Drainage systems, Reasonable use, Surface runoff, Comprehensive planning, Long term planning, Decision making, Legislation, Legal aspects, Water law, Administration, Administra-tive decisions, Water zoning, Water policy, Land use, Land management, Regulation.

Plaintiff landowner was denied a special exception to an interim moratorium for construction in flood prone areas by the defendant Board of Adjustment. In seeking reversal of that denial plaintiff contended that the moratorium, imposed while the municipality considered options for flood control improvements, represented an unconstitutional taking of property under the fourteenth amendment by denying plaintiff the right to improve his lands. The defendant responded that the moratorium was a stopgap measure to allow time for construction and design of adequate flood prevention mechanisms, and as such was a legitimate exercise of police power exercised for the public welfare. The court noted that plaintiff, if allowed to construct his industrial area, would increase rain water runoff into already over-burdened streams as well as subjecting himself to future flooding.
The length of the moratorium, limited to one year. was a reasonable exercise of zoning powers to allow proper study and construction of the im-provements, and therefore was not an abuse of po-lice powers. However, since the value of the land zoned for industrial use was limited by the mora-torium, the court agreed with plaintiff that it was inequitable not to adjust the tax rate imposed on that land for the duration of the moratorium. The considerable problems that periodic flooding posed to the general welfare justified the reasona-ble imposition of construction limitation through temporary zoning, and plaintiff's claim of right to an exception was denied. (Salley-Florida) W75-03467

COMMONWEALTH V. WASHINGTON TOWNSHIP (ACTION TO ORDER COMPLIANCE WITH CLEAN STREAMS LAW). 316 A 2d 107 (Pa Cmwith 1974).

Descriptors: *Pennsylvania, *Judicial decisions, *Sewage effluents, *Local governments, *Adjudication procedure, Streams, Sewerage, Sewage disposal, Sewage treatment, Water pollu-tion, Water pollution sources, Administrative agencies, Ecology, Law enforcement, Penal-ties(Legal), Jurisdiction, Water law, Water pollu-tion control, Pollution abatement, Legislation Water policy.
Identifiers: Administrative regulations, Effluent

limitations, State policy.

An action was brought by the Commonwealth of Pennsylvania against various local government agencies to enforce the final orders of the Department of Environmental Resources (DER) requiring the respondents' agencies to negotiate and enter into agreements for the planning, designing, financing and operating of sewage facilities within their respective territories. The Commonwealth contended that the respondents failed to comply with the various orders of the DER and that they should be compelled to do so under the Clean Streams Law (CSL). The Respondents countered that the pertinent section of CSL did not provide for the enforcement of sewage pollution abate-ment procedures and that the suit had been brought improperly. The Court held that it did not have the jurisdiction to enter the Commonwealth's petition as filed because the section of the CSL under which the Commonwealth sought relief did not expressly provide for direct enforcement of an order. The Court ordered the case dismissed without prejudice so that the Commonwealth might institute an action under the proper enforcement sections of CSL. (Dillingham-Florida) W75-03468

MUSUMECI V. STATE (ACTION BY DOWNSTREAM LANDOWNERS TO RECOVER FLOODING DAMAGES CAUSED BY RELOCA-TION OF HIGHWAY). 351 NY S 2d 211 (1974).

Descriptors: *New York, *Judicial decisions, *Floods, *Streams, *Highway relocation, Highways, Right-of-way, Surface runoff, Vegetation effects, Drainage water, Surface drainage, Riparian land, Riparian rights, Construction, Road construction, Engineering structures, Drainage engineering, Channeling, Culverts, Legal aspects. Identifiers: Nuisance(Legal), Water rights(Nonriparian).

Action was brought by downstream landowners against the State of New York to recover for damages caused by flooding allegedly caused by the State's relocation of a highway. During the construction and relocation of Route 57 the vegetation on the right-of-way was removed. Drainage ditches collecting surface run-off water from the highway were constructed, and culverts concentrating and channeling these waters into a nearby creek were built. These measures taxed the stream beyond its capacity and caused it to over-flow onto the claimants' property. Landowners contended that the flooding was caused by the construction of the highway while the State claimed it was caused by an abnormally heavy rainfall. The New York Supreme Court held that the State has no greater right than an individual to collect surface water from its lands into an artificial channel and to discharge it upon the lands of another, nor has it any legal immunity for creating nuisances. The State was held liable to the downstream owners for the flooding of their lands. (Dillingham-Florida) W75-03469

SMITH V. HADAD (PETITION TO REGISTER AND CONFIRM TITLE TO LAND). 314 NE 2d 435 (Sup Jud Ct Mass 1974).

Descriptors: *Massachusetts, *Judicial decisions, *Legal aspects, *Land tenure, *Boundary disputes, Streams, State governments, Decisionmaking, Planning, Adoption of practices, Measurement, Watercourse, Water resources, Water law, Boundaries(Property), Water policy. Identifiers: Easements.

Action was brought to confirm title to land. The land court ordered registration as applied for except for a thirty-three foot strip. On appeal the court held that in the absence of a clear showing of a contrary intent, where the boundary of a tract was described in a deed as running westerly onehundred and seventy-five feet from a named street, there was a presumption that the measurement was from the sideline of the street. Mas-sachusett's rights in the street were by way of easement rather than in fee simple absolute. After the taking of an easement for a public way the fee to the underlying land remains in adjoining property owners. The court after reviewing the weight of

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authority held in the absence of a clear showing of a contrary intent, a measurement given from a stream or public or private way shall be presumed to begin at the side line of that stream or way. (Sperling-Florida) W75-03470

JEWETT V. REDWATER IRRIGATING AS-SOCIATION (ACTION FOR ADJUDICATION OF WATER RIGHTS). 220 NW 2d 834 (S Ct SD 1974).

Descriptors: *South Dakota, *Judicial decisions, *Water rights, *Water allocation(Policy)* Adjudication procedure, Water eluciation, Vater demand, Water delivery, Legal aspects, Land tenure, Streamflow, State governments, Rivers, Water resources, Water supply, Water shortage, Water utilization, Legal review, Water distribution(Applied), Water supply development. Identifiers: Standing(Legal aspects).

An action was brought for the adjudication of water rights against the Redwater Irrigating Association and the South Dakota Water Resources Commission. The plaintiffs demanded delivery of irrigation water from the irrigation association. The Commission sought a declaratory judgment asserting their control over the water rights in the entire river irrigation system. The Circuit Court entered judgment for the plaintiffs. The Supreme Court affirmed holding where plaintiff's predeces-sor in title to land did not succeed to the water right located by another, the water used for irrigation of the land did not gain the status of an appurtenance. Therefore, the water was not used as a matter of right by the landowner. Where the grant or refusal to grant additional water to plaintiffs did not affect other water users above or below the stream, the state was not required to join the other claimants of water rights as parties in order to obtain a complete adjudication of the entire river irrigation system. (Sperling-Florida) W75-03471

CAMPBELL V. VILLAGE OF OQUAWKA (ACTION TO ENJOIN CITY FROM MAINTAIN-ING A LEVEE ABUTTING ITS PROPERTY). 307 N.E.2d 418 (III App 1974).

Descriptors: "Illinois, "Judicial decisions, *Leves, "Relative rights, *Local governments, Water management(Applied), Flood protection, Legal aspects, Equity, Flood routing, Flood control, Legal review, Public rights, Water policy, Land tenure, Eminent domain. Identifiers: Injunctions(Mandatory).

Plaintiff landowner sought an injunction against defendant municipal corporation compelling removal of an emergency levee constructed by the defendant along the street abutting the plaintiff's property. The lower court ordered removal of the levee from a portion of the street in front of the plaintiff's premises, but refused to compel removal along the entire block in which the plaintiff's property was located. On appeal by the plaintiff, the Appellate Court of Illinois affirmed the lower court ruling. In a memorandum opinion, the appellate court ruled that owners of property abutting a street have a right to use of their property, including the right of ingress and egress over and by means of the adjacent portion of the street, but the rights of such owners, particularly riparian landowners, are subservient to the public need for protection from floodwaters. In the absence of any arbitrary action or abuse of police power by the village in constructing a levee for emergency flood for damages. (Deckert-Florida)
W75-03472 STATE EX REL. INDIANAPOLIS WATER CO. V. BOONE CIR. CT. (ACTION BY WATER COMPANY FOR WRIT OF PROHIBITION). 307 N.E.2d 870 (Ind 1974).

Descriptors: *Public utilities, *Legal review, *Adjudication procedure, *Administrative decisions, *Indiana, Water law, Legal aspects, Water allocation(Policy), Judicial decisions, Public rights, Equity, Contract administration, Administrative agencies, Water distribution(Applied), Governments, Regulation, Water supply. Identifiers: Class action suits, Administrative regulations.

Plaintiff, water company and its wholly owned subsidiary, brought action for a writ of prohibition barring the Circuit Court from further proceedings in a pending class action, brought by customers of the water company to recover damages for alleged missconduct and improper rate charging. The real-tors contended that the conduct in question was at all times known to the Public Service Commission and the Commission did, in fact, consider the disputed conduct in determining the rates to be charged. The respondents position was that an Indiana statute and prior decisions of the Indiana Supreme Court allowed them to pursue a judicial remedy when dissatisfied with rates charged by a business affected by the public interest. The Supreme Court held that this rule did not apply where the legislature has provided a regulatory structure, in this case the Public Service Commission, and where there was no fraudulent concealment of information on the part of the regulated business. The court held that the proper remedy for the respondents was an administrative appeal from the action of the Commission rather than an action for damages. An alternative writ was issued. (Deckert-Florida)

ROBERT E. NILLES, INC. V. ILLINOIS POLLU-TION CONTROL BD. (ACTION AGAINST POL-LUTION CONTROL BOARD FOR DENIAL OF SEWERAGE PERMITS). 308 N.E. 2d 640 (III App 1974).

Descriptors: *Illinois, *Judicial decisions, *Water quality control, *Non-structural alternatives, *Legal review, Waste water(Pollution), Permits, Water management(Applied), Legal aspects, State governments, Administrative agencies, Legislation, Waste water disposal, Water quality, Water law, Adjudication procedure, Sewage, Water pollution, Water pollution control, Water pollution sources, Water resources development, Adoption of practices.
Identifiers: *Administrative regulations, Presumptions(Legal).

Petitioner corporation sought a variance without hearing from an order of the Illinois Pollution Control Board withdrawing sewer connection permits previously granted to the petitioner. The petition for a variance was summarily dismissed by the Board on the grounds that there was no proof that compliance with the order would impose an ar-bitrary or unreasonable hardship on the corporation. The Appellate Court of Illinois overturned the Board's decision. The court ruled that the corporation's petition alleged facts sufficient to support a claim of arbitrary or unreasonable hardship and thus petitioner was entitled to a hearing on the merits. A condition imposed on issued permits, that if any statement in the application was found to be incorrect, the permit might be revoked and all rights thereunder lost, did not limit the petitioner's future right to seek a variance or a new permit, nor did it interfere with the petitioner's right to claim equitable estoppel or estoppel in pais. Administrative boards have broad discretionary powers, but such powers must be exercised judiciously, not arbitrarily. (Deckert-Florida) W75-03474

MEHLING V. DEINES (ACTION TO COMPEL DEFENDANT TO REOPEN DITCH TO PROVIDE PROPER DRAINAGE). 214 N. W. 2d 627 (Neb 1974).

Descriptors: *Groundwater, *Nebraska, *Judicial decisions, *Prescriptive rights, *Water law, Water flow, Groundwater movement, Runoff, Water sources, Groundwater runoff, Potential flow, Discharge, Prescriptive rights, Legal aspects, Water rights, Water policy, Irrigation, Irrigation canals, Irrigation ditches, Water management(Applied), Irrigation practices, Administration, State governments.

Identifiers: Presumptions(Legal), Water rights(Non-riparians).

Action was brought by the plaintiff-appellant, a landowner, to compel the defendant-appellee, an adjacent landowner, to reopen a ditch to provide drainage for the plaintiff's land. Defendant closed the ditch after sustaining crop damage from the run-off of plaintiff's irrigation water. Plaintiff contended that he had acquired an easement by prescription to drain water from his land through the extension ditch on the defendant's land. The court affirmed the lower court and held that plaintiff's proof failed to establish his prescriptive right for drainage across the defendant's land. The court explained that the common practice in the local area was to use drainage ditches established by the regional management district to dispose of irrigation waste water. The plaintiff used the ditch on the assumption that it was a district ditch. Therefore the use was permissive and not adverse and no claim of right was established. A use by express or implied permission or license cannot repen into an easement by prescription. (Sperling-Florida)

PIERCE V. RILEY (ACTION BY LAKE OWNERS FOR INJUNCTIVE RELIEF). 215 N.W.2d 759 (Mich App 1974).

Descriptors: *Michigan, *Riparian rights, *Relative rights, *Reasonable use, *Equity, Judicial decisions, Legal aspects, Water law, Land denure, Non-structural alternatives, Adjacent landowners, Easements, Riparian land, Water rights, Land use, Legal review, Central United States, Canals, Water resources development, Water allocation(Policy), Preferences(Water rights), Water distribution(Applied), Water policy. Identifiers: Injunctive relief, Water rights(Non-riparian).

Owners of lake property sought declaratory and injunctive relief against owners of a single lot through which a canal was constructed to provide access to the lake to ninety non-riparian lots. These lots were also owned by the defendants and were being developed as if the entire project had riparian rights. This plan would have increased the number of residents having access to the lake by sixty-six percent. The lower court enjoined the defendants from granting any of the non-riparian lot owners right-of-way easements to the canal, but refused the plaintiffs' request that the canal be ordered filled. Plaintiffs appealed, contending the lower court's order could not be effectively enforced. Defendants asserted that since the plaintiffs did not specifically request the canal be filled in their prayer for relief, the courts had no power to issue such an order. The Court of Appeals of Michigan ruled that since this action was equitable in nature, the courts were not bound by the prayer for relief. Finding the proposed project sufficiently injurious to the riparian owners as to constitute an unreasonable use, the Court of Appeals reversed the lower court and ordered the canal filled. (Deckert-Florida)

COMMONWEALTH OF KENTUCKY, DEPARTMENT OF HIGHWAYS V. FITZPATRICK

(EMINENT DOMAIN ACTION FOR TAKING OF RIVER BOTTOM LANDS). 504 S.W.2d 687 (Ky 1974).

Descriptors: *Kentucky, *Judicial decisions, construction, *Property values, *Road construction, "Froperty values,
*Adjudication procedure, Right-of-way, River basins, Highways, Roads, Market value, Land appraisals, Pricing, Real property, Land tenure, Land use, Evaluation, Land, Eminent domain,

*Administration acceptable Administration, Com-Administrative agencies, Administration, Compensation, State policy.

Condemnation action was brought by the Kentucky Department of Highways to acquire rightof-way for construction of a highway through respondent's land. The Circuit Court awarded landowners \$150,000.00 The Department on appeal contended that the award was excessive. The landowners countered that the award for taking 29.89 acres of river bottom land and level-to-rolling land located in a county where level land was in short supply was not excessive. The Court of Appeals held that the issue of the award was a jury issue and that the verdict rendered was supported by the evidence. The land, that the state had taken, was a portion of the most valuable in the county and therefore the verdict was not excessive. Judgment was affirmed. (Dillingham-Florida)

BEANE V. PRINCE GEORGE'S COUNTY (ACTION FOR DAMAGES FOR UNNATURAL WATER FLOW) 315 A.2d 777 (Md App 1974).

Descriptors: *Maryland, *Judicial decisions, *Outlets, *Discharge(Water), *Damages, Surface runoff, Surface waters, Drainage, Drainage effects, Drainage systems, Drainage engineering, Local governments, Urban drainage, Drainage water, Road construction, Pipes, Subsurface drains, Legal aspects, Water, Water policy. Identifiers: Injunctive relief, Nuisance(Legal).

Landowners brought action against owners of adjacent property for alleged invasion of privacy, in-terference with pursuit of business, and slander of plaintiffs' title. The subject of the controversy was the improvement of a road near the litigants' pro-perty which involved installation of catch basins and a metal drainage pipe extending from that road past four residences including defendant's onto plaintiff's property, where it terminated in an out-fall. Defendant landowners counterclaimed for water damages whereupon plaintiffs counterclaimed for damages and injunction prohibiting the county from further allowing unnatural surface water to flow on plaintiffs' land. Plaintiffs asserted that the outfall caused continuing damage to his property. The county asserted that there was no actual damage but merely a technical violation whose correction did not justify the county's effort and expense. The court did not agree that of the remedial alternatives proposed by the county none was practicable and at the same time reasonable in cost in proportion to the continuing damage suffered as a result of the continuing discharge of surface water. The court granted in-junctive relief to the plaintiffs against the county. (Dillingham-Florida) W75-03478

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND CANADA ON GREAT LAKES WATER QUALITY. For primary bibliographic entry see Field 5G. W75-03480

OLIVER V. MILLIKEN AND FARWELL, INC. (ACTION INVOLVING DIVISION AMONG RIPARIAN OWNERS OF ALLUVIAL DEPOSITS). 290 So. 2d 738 (La 1974).

Descriptors: *Louisiana, *Judicial decisions, *Accretion(Legal aspects), *Riparian rights, *Ownership of beds, Beds under water, River beds, Bottom sediments, Navigable rivers, Rivers, Navigable waters, Riparian land, Property, Surveys, Legal aspects, Prescriptive rights, Boundaries(Property), Mapping, Topography, Erosion, Sediments, Bank erosion, Beds.

The action involves the division among riparian owners of alluvial deposits known as Solitude Point which contains approximately 3,500 acres and is located on the west bank of the Mississippi River in the Parish of West Baton Rouge. Plaintiff-appellant and defendant-appellee are adjacent plantation owners who both alleged acquisitive prescription of various portions of Solitude Point. The trial court and the 1st Circuit Court of Appeal held that the evidence presented by the principal defendant did not establish its continuous, uninter-rupted, actual, physical and corporeal possession of all of the controverted property, nor did it establish the location and extent of the batture that it allegedly possessed for 30 years. The court further held that the alluvion as an entirety should be apportioned as of the time that the suit to divide that alluvion was commenced. In dividing it among riparian owners the frontage to frontage method was properly used where it would produce the fairest results for all of the riparian owners, other methods resulted in inequitable division. (Dillingham-Florida)

W75-03481

ASKEW V. TAYLOR (ACTION FOR EQUITA-BLE RELIEF AGAINST STATE FOLLOWING DENIAL OF APPLICATION FOR DREDGE AND FILL PERMITS FOR BOTTOMLANDS). 299 So. 2d 72 (1st D.C.A. Fla 1974).

Descriptors: *Florida, *Judicial decisions, *Legal aspects, *Land tenure, *Fill permit, Regulation, Environmental effects, Administration, Planning, Decision making, Economic aspects, Administra-tive agencies, Water resources, Application methods, Water resources development, Adjudi-cation procedure, Permits, Local governments, Equity, Contracts. Identifiers: State policy.

Action was brought by a successor in interest to a purchaser of bottomlands against Reuben Askew, the governor of Florida. The plaintiff prevailed in the lower court and on this appeal from that decision in his request for relief against the state following the denial of his application for a dredge and fill permit. Plaintiff's predecessor had paid the purchase price to the Internal Improvement Fund. It was clearly intended that filling would take place out to the then-established bulkhead line and it was on that basis that the trustees fixed the price. Before executing the deed it is assumed the trustees of the fund had made findings to make their acts legal. No loss or legal injury would be suffered by the trustees of the fund of the state by granting relief seven years after the sale of state-owned submerged land. The slight, if any, changes in ecological conditions which had taken place could not impair the legal rights of the plaintiff. (Sperling-Florida) W75-03482

EVOLUTION OF THE SMALL WATERSHED PROGRAM, CHANGES IN PUBLIC LAW 566-WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM, 1954-72, Economic Research Service, Washington, D.C. National Resource Economics Div. For primary bibliographic entry see Field 4D. W75-03483

ADVISORY REPORT ON HEALTH EFFECTS OF NITRATES IN WATER.
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5C.

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING.

Rivkin/Carson, Inc., Washington, D.C. Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as PB-230 209, \$3.75 in paper copy, \$2.25 in microfiche. Report HUD-PDR-001C, June 1973. 24 p, 11 ref, 1 tab. HUD H-2095-R.

*Federal government, *Legislation, Descriptors agencies, *Legislation, *Environmental control, Administrative *Economic impact, *Environmental control, Inter-agency cooperation, Water policy, Water Quality Act, Federal Water Pollution Control Act, Regulation, Administration, Governmental inter-relations, Environmental effects, Adoption of practices, Comprehensive planning, Water law, Legal aspects, Water resources development, Forecasting, Social impact, Prices, Administrative decisions.

Identifiers: *National Environmental Policy Act, Environmental policy, Administrative regulations Environmental impact statement, FWPCA Amendments of 1972.

Many aspects of the Department of Housing and Urban Development's activities are affected by recently passed federal environmental protection legislation. The effects of this legislation upon the Department's present activities and upon the fu-ture production and preservation of the nation's housing supply are analyzed. Examined specifically are the effects of the National Environmental Policy Act, Executive Order 11514, and the guidelines promulgated by the Council for Environmental Quality. Also analyzed are the effects of recent legislation and regulatory action in the areas of air and water quality control and waste disposal. Also discussed are the actions taken by the Department to implement the Environmental Protection Act. While the environmental legislation and standards may lead to better quality ing, they may also result in a slow-down in the production of new housing, an increase in housing costs, and increased urban sprawl. (Deckert-Florida) W75-03485

TRANSLATIONS ON ENVIRONMENTAL **OUALITY, NO. 7.**

Joint Publications Research Service, Arlington,

Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161 as JPRS-61048, \$4.00 in paper copy, \$2.25 in microfiche. January 23, 1974. 37 p, 10 ref.

Descriptors: *Environmental control, *Pollution, Ecology, Meteorology, Water quality control, Governments, Pollution sources, Environmental sanitation, Water supply, Wastes, Sewage, Sewage treatment, Disposal, Environmental engineering, Water resources development, Water law, United States, International law, International joint commission, Environmental effects, Pollution abatement. Governmental interrelations. Federal government.

Identifiers: *International agreements. *Environmental policy.

The serial report contains translations from the world press of articles and press commentary on environmental pollution and its effects. Also discussed are pollution control technology, or-ganizations, and programs. The articles were written by authors from Eastern Europe, Latin Amer-ica, and the Soviet Union. Several themes run through the collection of articles. In order to avert an ecological crisis in the world, cooperation of Soviet and American scientists is necessary. Steps must be taken by both individual governmental entities and by nations working together to overcome rising pollution problems. Related to the world pollution problems is a discussion of the influences of future sanitation works as part of regional pollution abatement plans. Also discussed is the conser-

Group 6E-Water Law and Institutions

vation of available natural resources and the restoration of depleted resources where possible in order to protect the health and welfare of all. (Proctor-Florida) W75-03486

REGULATORY MANAGEMENT PROGRAMS FOR FLORIDA MARINE FISHERMEN, F. J. Prochaska, and J. R. Baarda.

Florida Sea Grant Publication SUSF-SG-74-003, 1974, 13 p. 1 tab.

Descriptors: *Fish management, *Commercial fishing, *Regulation, *Conservation, *Administration, Florida, Economic aspects, Cost-benefit analysis, Shellfish, Water resources, Administrative agencies, Planning, Aquiculture, Water resources development, Water management(Applied), Economic aspects, Regulation, Comprehensive planning.

Identifiers: Administrative regulations, State pol-

The management of a fishery is very different from the management of a business. Within a given fishing season a fisherman can manage his own operation for the greatest economic benefit to himself. Also, a factor in this business is maintaining the fishery for future production, however, because of a lack of property rights in the fishery resource he cannot, acting alone, manage the fishery resource in the long run. There is a common property ownership among the citizens of the State with fishery resources. As a consequence, management of fisheries falls largely on governmental bodies. The fishery management programs administered by the State of Florida to fishermen, marine extension agents, and others concerned with marine commercial fishing are described. The institutional framework and current regulatory systems of Florida fisheries management programs are summarized. Separate sections deal with lobsters, shrimp, and oysters. (Sperling-

A PROGRAM FOR THE FUTURE--WATER AND SEWER IN RURAL AMERICA. Commission on Rural Water, Washington, D.C. For primary bibliographic entry see Field 5D. W75.03488

W75-03487

PROPOSED LEGISLATION FOR ARTIFICIAL GROUNDWATER RECHARGE, Florida Univ., Gainesville. Coll. of Law. For primary bibliographic entry see Field 4B. W75-03489

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION, Department of State, Washington, D.C. For primary bibliographic entry see Field 6G.

WATERSHED PROTECTION AND FLOOD PREVENTION PROGRAM AND RESOURCE CONSERVATION AND DEVELOPMENT PRO-GRAM--PROPOSED WATER QUALITY MANAGEMENT GUIDELINES. SOIl Conservation Service, Washington D.C.

Soil Conservation Service, Washington, D.C. For primary bibliographic entry see Field 5G. W75-03491

DI VOSTA RENTALS INC. V. LEE (REVIEW OF DENIAL OF FILL PERMIT). 488 F.2d 674 (5th Cir 1973).

Descriptors: *Judicial decisions, *Florida, *Rivers and Harbors Act, *Legislation, *Decision-making, Adoption of practices, Navigation, Planning, Lakes, Construction, Navigable waters, Legal aspects, Administration, Administrative agencies,

Estuarine environment, Water conservation, Water quality control, Water law, Water resources development.

Identifiers: Administrative regulations, Navigation obstructions, Fill permits, *Licenses.

Court action sought review of an order of the Secretary of the Army denying application for a permit to fill navigable waters of a lake. On the filled land an apartment building was to be constructed. The U.S. District Court for the Southern District of Florida ordered the permit issued. The Court of Appeals for the Fifth Circuit held the agency action could not be set aside unless appelee had shown arbitrary, capricious action or an abuse of discretion. The Secretary's denial was not improper in view of objections of other government agencies and private citizens that the filling would damage the lake which was a valuable estuarine area. The Fifth Circuit vacated the prior opinion and held that under the Rivers and Harbors Appropriation Act of 1899, which banned the obstruction of navigable waters, subject only to exceptions authorized by the Secretary's exercise of discretion but may not substitute its own judgment for that of the Secretary. (Spering-Florida) W75-03492

BONELLI CATTLE CO. V. ARIZONA (QUIET TITLE ACTION). 94 S. Ct. 517 (1973).

Descriptors: *Arizona, *Judicial decisions, *Riparian land, *Legal aspects, *Accretion, Channelling, Colorado River Basin, Rivers, River beds, River training, Federal jurisdiction, Avulsion, Navigable rivers, Channels, Width, Riparian rights, Land, Land tenure, Submerged Lands Act, Channel improvement, Public lands, Water law, Water rights, Riparian land, Ownership of beds, Navigable rivers, Navigable waters. Identifiers: Territorial waters, State policy.

Action was brought by riparian owner against the State of Arizona to quiet title to land which had once been submerged when the Colorado River had moved eastward, but which had reemerged as a result of a federal rechannelling project. Defendant claimed title as the owner of beds under navigable streams within its borders. Plaintiff asserted that whether river changes were accretive or avulsive, he held title as riparian owner. The U.S. Supreme Court granted certiorari and held that the ownership of subject land was governed by federal law. Land emerging by narrowing the river channel belongs not to the defendant state, as owner of the riverbed, but to the plaintiff riparian owner. The state could not claim the land which reemerged following the federal rechannelling project because public purpose was no longer served by state ownership. In view of the respective interests of plaintiff and defendant and in light of the rationale for the federal common law doctrines of accretion and avulsion, the surfacing would be treated as an accretion. Title vests in the riparian owner. (Dillingham-Florida) W75-03493

THE PLANNING AUDIT: A FRAMEWORK WITH PARTICULAR REFERENCES TO RIVER BASIN PLANNING.

For primary bibliographic entry see Field 6B. W75-03525

GREAT LAKES WATER QUALITY, 1973 ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.

International Joint Commission-United States and Canada. Great Lakes Water Quality Board. For primary bibliographic entry see Field 5G. W75-03640 LANDS LYING UNDER PUBLIC WATERS. Vt Stat Ann Title 29, secs 401-409, (1967).

Descriptors: *Vermont, *Legislation, *Water law, *Water resources, *Water management, *Water structures, *Lakes, *Ponds, Land use, Land management, Filling, Dredging, Boundaries, Public rights, Water resources development, Wildlife conservation, Recreation, Recreation demand, Scenery, Dams, Navigation, Structures. Identifiers: Public trust doctrine.

Public lands lying under lakes and ponds which are public waters of Vermont are a public trust. It is a policy of the state that these lands be managed in the public trust and to promote the general welfare by the Vermont water resources board (board). Unless authorized by the board, a person shall not in any manner place any material in or displace the public or boundary waters of the state with construction, fill or other artificial encroachment. Nor shall any person alter the bed of any lake or pond underlying such public or boundary waters. This act shall not be construct to prohibit erection of temporary removable seasonal type structures or construction of temporary or permanent private piers if ordinary navigation is not impeded. This act shall not apply to construction of dams. Any person desiring to construct a structure, or place any material upon the bed of a lake or pond which is a public water shall apply in writing to the board for authority to do so. In acting upon applications the board shall determine the public good based upon the effect to scenic and recreational values, fish and wildlife, hazards to navigation, and other public uses. (Silber-Florida)

DAMS.

Vt Stat Ann tit 30, secs 401-406, (1967).

Descriptors: *Dams, *Reservoirs, *Water levels, *Legislation, *Vermont, *Water law, *Water fluctuation levels, *Water utilization, Water control Levees, Water resources, Water storage, Water management, Flood prevention, Watershed protection, Watersheds(Basins), Water management(Applied), Water levels, High water mark, Low water mark.

The Vermont public service board shall determine the maximum and minimum water levels of Lake Seymour, at the outlet, and have these levels certified and recorded. The waters of Lake Seymour shall not by any artificial means be raised higher or drawn lower, or permitted through neglect to become lower or higher, than the maximum and minimum levels established by the board. The board shall establish maximum and minimum levels of Great Averill Pond, Little Averill Pond, and Norton Lake, at their outlets. When such levels are so established, the board shall certify and record these levels. These waters shall not by any artificial means be raised higher or drawn lower, or permitted through neglect to become lower or higher, than the maximum and minimum levels established by the board, and penalties are prescribed for so doing. (Silber-Florida) W75-03672

SCENERY PRESERVATION COUNCIL. Vt Stat Ann, Title 10 secs 261-265, (1973).

Descriptors: *Vermont, *Legislation, *Conservation, *Preservation, *Natural use, Scenery, Recreation, Resources planning, Natural use, Land resources, Land development, Land management, Land conservation, Scenic highways, Aesthetics.

The scenery preservation council (council) was established to preserve and enhance Vermont's scenic value. In conjunction with this enactment, the departments of highways, parks, fish and game, water resources and the board of historic sites may acquire land or rights and interests

therein to facilitate this goal. These departments may also improve the land acquired as to accommodate the traveling public. The council shall carry on a continuing comprehensive planning process to inventory and classify scenic corridors, areas and sites; to analyze the scenic values in-cluding the general location of areas of special cluding the general location of areas of special need; and to make specific proposals for such new areas. The council shall also advise the state planning director in regard to the scenery preser-vation plan; encourage and assist in fostering public awareness, understanding, and participa-tion in the objectives and functions of scenery preservation; and report biennially to the governor and general assembly upon the effectiveness of this act and any recommendations regarding scenic preservation. (Silber-Florida) W75-03673

INTERAGENCY COMMITTEE. Vt Stat Ann, Title 10, secs 21-23, (1973).

*Legislation. Descriptors: *Vermont. *Conservation, *Natural resources, *Planning, Development, Management, Control, Administration, Administrative agencies, Adoption of practices, State governments, Coordination, Cooperation, Operations.

This act establishes an interagency committee in the office of the governor to be the coordinating branch of state government among the depart-ments related to and concerning natural resources. The duties of the committee are to coordinate the activities of the various member agencies for the proper development, management and preservation of Vermont's natural resources, to develop policies for the proper development of resources in harmony with the state's comprehensive planning program, and to promote effective appli-cation of these policies by the departments af-fected. (Silber-Florida)

CONSERVATION-ALTERATION OF STREAMS. Vt Stat Ann tit 10 sec 671-675, (1973).

Descriptors: *Vermont, *Legislation, *Water law, *Streamflow, *Routing, *Structures, *Alteration of flow, Flood control, Riparian rights, Wildlife conservation, Obstruction to flow, Erosion control, Bank stabilization, Bank protection, Fish, Wildlife, Currents(Water), Streams.

No person or municipality shall change, alter or modify the course, current or cross section of any stream containing ten or more square miles of drainage area, or along the boundaries of Vermont by use of construction equipment or similar mechanical devices. Fill or excavations of ten or more cubic yards is prohibited unless authorized by the water resources department (department). This act shall not apply to proper stream bank stabilization measures for protection of existing property or to construction of dams. A person or mu-nicipality proposing to change or diminish the course, current or cross section of a stream shall apply in writing to the department for authority to do so. The fish and game commission shall investigate each application to determine the effect of the proposed change upon the fish life. If the department finds the proposed change is reasonable, will not adversely affect the public safety by increasing flood hazards, will not damage fish, wil-dlife or the rights of riparian owners and is consistent with the public good, the applications will be approved. (Silber-Florida) W75-03675

COMPENSATORY STORAGE,

C. J. Beise. Rocky Mountain Law Review, Vol 22, p 453-461, Descriptors: *Legislation, *Colorado River Basin, *Compensation, *Water storage, *Colorado, Water resources development, Reservoirs, Reservoir storage, Water distribution(Applied), voir storage, Water distribution(Applied), Drainage areas, River basins, River basin develop-Drainage areas, River oasins, River oasin develop-ment, Interagency cooperation, State govern-ments, Legal aspects, Constitutional law, Hydroelectric power, Diversion tunnels, Distribu-tion systems, Water management(Applied), Water distribution(Applied), Rocky Mountain Region. Identifiers: *Administrative regulations, *Water rights(Non-riparians).

Compensatory storage has had a variety of appli-cations and poses a problem to the full utilization of Colorado's water resources. The term refers to the problem of equitable apportionment of water between various parts of the state, notably the Eastern and Western slopes. Legislation during this century has attempted to provide replacement water through reservoir construction for the slope. from which water has been diverted for either a federal irrigation or hydroelectric power project. The recent Gunnison-Arkansas Project has sought to implement the technique of compensatory storage by creating committees to consider such issues as municipal demands, subordination of irrigation uses to power generation, water available for diversion, engineering problems and the principles of the project's operation. By creating a commission of representatives from the state, the federal government, the East and West slopes, it is hoped that in the public realm the state water distribution program will be based on equitable ap-portionment rather than priority. The priority docportionment rather than priority. The priority doctrine written into the state constitution gives the first in time the first in right. An equitable apportionment policy best serves the interests of the state although its constitutionality can by questioned. (Dillingham-Florida)
W75-03676

EFFLUENT NEIGHBORS: THE MEXICO-UNITED STATES WATER QUALITY DILEM-MA.

For primary bibliographic entry see Field 5G. W75-03677

ESTUARIES OF OREGON-ECOSYSTEMS IN CRISIS, PROBLEMS AND LEGAL SOLUTIONS, For primary bibliographic entry see Field 5G. W75-03678

NEW LEGISLATION FOR WATER QUALITY. For primary bibliographic entry see Field 5G. W75-03679

OHIO V. WYANDOTTE CHEMICALS CORP., RESTATEMENT OF THE ORIGINAL JU-RISDICTION OF THE SUPREME COURT OF THE UNITED STATES,

D. K. Lloyd. Environmental Law, p 358-367, Vol 2, No 2, Spring, 1972. 52 ref.

Descriptors: *Water law, *Judicial decisions, *Legal aspects, *Water pollution, *Ohio, Public rights, Nuisance(Water law), Discharge, Lakes, Pollution, Abatement, Mercury, Water policy, Pollutants, Water pollution sources, Jurisdiction, Federal government, State governments, Federal-state water rights conflict, Political aspects, Industrial waste, Industrial pollution, Regulation, Water management. Natural resources.

The State of Ohio sought to invoke the original jurisdiction of the United States Supreme Court in an action to abate a nuisance. The corporate defendants were all citizens of other states and countries. The alleged nuisance was the defendants' dumping of mercury into streams that eventually entered Lake Erie, resulting in contamination and pollution of the lake's water, vegetation, fish and wildlife. The U.S. Supreme Court declined its jurisdiction, noting probable jurisdiction of the Ohio state courts. Furthermore the Court stated that the capacity of trial courts to engage in fact finding procedures was more developed than that of the Supreme Court, notwithstanding their power to appoint masters and scientific experts to facilitate their own fact finding functions. Without referring to the list of positive and negative implications arising from the Wyandotte decision, the result seems to be an unequivocal statement that, at least in suits to abate nuisances, the Court will refuse to exercise jurisdiction where a state is suing the citizens of another state or country. (Silber-Florida) W75-03680

REGULATION OF GREAT LAKES WATER LEVELS-APPENDIX G-REGULATORY WORKS-REPORT TO THE INTERNATIONAL JOINT COMMISSION

International Joint Commission—United States and Canada. Great Lakes Levels Board. For primary bibliographic entry see Field 4A. W75-03682

DEPARTMENT OF ENVIRONMENTAL PRO-

Me Rev Stat Ann Ch 2, tit 38, sec 341-342 (Supp

*Environmental Descriptors: control. *Legislation, *Maine, Quality control, Natural resources, Environment, Public rights, Legal aspects, Ecology, Social aspects, Environmental effects, Land development, Resources, Water, Water quality, Conservation, Land resources, Land use, Water resources, Water resources development. Identifiers: *Environmental protection.

The Department of Environmental Protection is designated as an agency for the state of Maine to perform all duties the state may undertake regarding environmental control. The Department is established to protect and improve the quality of natural environment and resources, and to enhance the public's opportunity to enjoy the environment by directing growth and development which will preserve an ecologically sound and aesthetically pleasing environment. The Department shall consist of a commissioner appointed by the Governor and a Board of Environmental Protection, which will have broad powers to grant licenses, initiate enforcemental actions, negotiate and enter into agreements and to enforce other delegated duties. (Daniels-Florida) W75-03683

MISSISSIPPI AND MISSOURI RIVER ISLANDS ARE PROPERTY OF STATE.

Mo Stat Ann, sec 241.291 (Supp 1973).

Descriptors: *Missouri, *Legislation, *Land forming, *Islands, Land, Land tenure, *Mississippi River, *Missouri River, Wildlife, Recreation, Wildlife habitats, Wildlife conservation, L aspects, State jurisdiction, State governments.

All lands which belong to the state of Missouri, which have been created by the formation of which have been created by a strainant of islands in the Missouri and Mississippi rivers have been granted and transferred to the Missouri conservation commission for wildlife protection purposes. If the islands are deemed to have no present or future value for wildlife use, they shall then be transferred to the state park board for recreational purposes. If they have no value for recreational purposes, they shall be transferred to the counties in which they are located. All islands created and formed in the Missouri and Mississippi rivers subsequent to enactment of this statute are also the property of the state and will be treated as indicated above. (Ritchie-Florida)

Group 6E—Water Law and Institutions

A LOOK AT LEGISLATION DEFINING USES OF NATIONAL FOREST LANDS, PART TWO, R. Reid.

Forest Industries, p 32-33, December 1973.

Descriptors: *National forests, *Land use, *Preservation, *Water conservation, Forestry, *Watersheds(Basins), Adoption of practices, Environment, Environmental effects, Administrative agencies, Comprehensive planning, Water management(Administrative), Water resources development, Judicial decisions, Project planning, Federal project policy.

Identifiers: *National Environmental Policy Act,

*Environmental Impact Statements, *Wilderness Act, Council on Environmental Quality.

The Wilderness Act of 1964 has been interpreted by judicial decision to mean that the Forest Serovice is obligated to study areas contiguous to primitive areas for possible inclusion in the Wil-derness Preservation System. Another court indicated that the above ruling was faulty. The contention that study of contiguous areas is obligatory tention that study of configuous areas is obligatory is not supported by evidence of Congressional in-tent. The proposed wilderness system is to be con-fined to those areas of public land that have al-ready been set aside for recreational use. The National Environmental Policy Act of 1969 was not intended to control every action by the Federal Government in the environmental field. Environmental impact statements were not intended to be an end in themselves. The Council on Environmental Quality was not established as an administrative group or to pass judgment on environmental impact statements beyond their completeness. The contention that the Act requires the Council on Environmental Quality to hold public hearings and approve impact statements is not supported by law. The criticism can be analogized to any type of environmental impact statement including those concerned with water use. (Barnes-Florida)

ENVIRONMENTALISTS ATTACK ADMINISTRATION, INDUSTRY PLANS TO WEAKEN NEPA AND SET BACK RECENT CLEAN AIR GAINS.

For primary bibliographic entry see Field 5G. W75-03687

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE, Maine State Planning Office, Augusta. Coastal Planning Group.

H. P. Henry. December 1973. 76 p, 307 ref, 14 photo.

Descriptors: *Shorelines. *Comprehensive planning, *Legal aspects, *Adoption of practices, Water manage-ment(Applied), Administrative agencies, Decision making, State governments, Legislation, Planning, Water policy, Adjacent landowners, Recreation, Natural resources, Scenery, Tourism, Environmental effects, Water law, Ecology, Resources development, Water resources development, Resource allocation, Property values. Identifiers: State policy, *Coastal zone manage-

A general appraisal is presented of the current conditions, laws, and influences on the use of the Maine coastline, with specific recommendations for legislation to remedy present weaknesses and provide a workable framework for resource pro-tection and conservation. The Maine legislature has expressly designated recreation as the highest and best use for the coastal areas. The effects of tourism in encouraging development and over-crowding are reviewed. To maximize public access to the beaches while minimizing the loss to adjacent landowners, an open beaches act is es-poused which would require the state to maintain not only accessibility but also police protection,

and conserve the beaches to preclude despoilation by the public. Emphasized is the need for com-prehensive state policy and planning to integrate conservation efforts and allocate resources on other than an ad hoc basis. A systematic overview of current state environmental legislation is presented and contrasted against new requirements to bring the state within the federal Coastal Management Act requirements, which would then management act requirements, winca would use make available federal financial support for future programs. The analysis concludes with sug-gestions for a conceptual approach to coastal management and a legal and administrative framework for that management. (Salley-Florida) W75-03689

WINNIPESAUKEE RIVER BASIN CONTROL. New Hampshire Session Laws, Ch 41, Subsection 41:1-41:5, p 187-189, 1974.

Descriptors: *New Hampshire, *Governmental interrelations, *Rivers, *Administrative agencies, Administration, Legislation, Planning, Construction, Economic aspects, Government finances, Federal government, State governments, Sewage disposal, Sewage treatment, Water pollution, Treatment facilities, Pumping, Sewage districts, Sewers, Water law, Water policy, Regulation, Identifiers: Administrative regulations, State policv. Environmental policy.

The New Hampshire water supply and pollution control commission is authorized to acquire plan, construct, and operate any and all sewage and waste disposal facilities eligible for federal and state aid. All operations will be in accordance with basin and regional treatment needs consistent with federal and state requirements. The authority to construct includes all engineering services in addition to the construction of new sewage or waste treatment plants, pumping stations, and intercepting sewers. In order to achieve reliability and efficiency the commission is authorized to locate sewer and related facilities in all public roadways, whether owned or controlled by the municipality or the state. The commission will annually assess each municipality served by the regional sewage disposal facilities a sum sufficient to recover its proportional share of the total costs. (Sperling-Florida) W75-03690

WATER STRATEGY PAPER HIGHLIGHTS EPA POLICIES.

For primary bibliographic entry see Field 5G. W75-03691

WATER PROGRAM POLICY ISSUES, (EPA POLICY DIRECTIVES).
For primary bibliographic entry see Field 5G.
W75-03692

EXPLANATORY STATEMENT: IMPLEMENTA-TION OF NPDES, (EPA).
For primary bibliographic entry see Field 5G.

W75-03693

DAMS AND RESERVOIRS. Maine Legislative Service, Vol 1, Ch 787, Subsection 251-254, and 180-186, p 332-336, approved April 1, 1974 (1974).

Descriptors: *Maine, *Dams, *Reservoirs, *Regulation, *Safety, *Public health, Legislation, Wildlife conservation, Fisheries, Water quality control, Environmental sanitation, Local governments, Federal government, Administration, Adoption of practices, Water manage-Adoption of practices, Water manage-ment(Applied), State governments, Administra-tive agencies, Legal aspects. Identifiers: Administrative regulations, State pol-

Many dams in Maine have unknown owners. Some dams are in such a state of disrepair that they are dangerous to life and property, including wildlife, fisheries, and waters, as well as the public's health, safety, and welfare. There are people who will accept ownership of these dams, along with maintaining and repairing them. Legislation now provides that any person may petition the Soil and Water Conservation Commission to be awarded ownership of any dam, the owner of which is unknown. The Commission will give notice of the petition to the municipality in which the dam is located, and also by publication. Emergency plans and actions for the safe operation of dams and reservoirs are necessary to protect life and proper-ty. No person, except the federal government, will exercise any authority over the emergency regulation of any dams or reservoirs in the state, where such exercise would conflict with the powers and authority vested in the Bureau of Civil Defense. (Sperling-Florida) W75-03694

TRANSLATIONS ON ENVIRONMENTAL QUALITY NO. 8.

Joint Publications Research Service, Arlington, Va. For primary bibliographic entry see Field 5G. W75-03696

OCEAN DISPOSAL PRACTICES AND EFFECTS (REPORT OF MEETING HELD IN NEW YORK

ON SEPTEMBER 26-29, 1972).
President's Water Pollution Control Advisory
Board, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-03697

RIVERS, STREAMS AND BROOKS--ALTERA-

Maine Legislative Service, Vol 1, Ch 786, secs 2206-2212, p 330-331, approved April 1, 1974

Descriptors: *Maine, *Permits, Rivers, *Streams *Dredging, Construction, Regulation, Legal aspects, Legislation, Adoption of practices, Adaspects, Legislation, Adoption of practices, administration, Water supply, Administrative agencies, Decision making, State governments, Wildiffe conservation, Recreation, Navigable waters, Soil conservation, Natural flow, Water quality control, Local governments, Water quality, Pollution absences.

Identifiers: *State policy, *Injunctive relief.

In Maine it is unlawful for any person or state agency to dredge, fill, or construct any structure in the state's rivers, streams, or brooks, without a permit. The applicant for the permit must demon-strate that the proposed activity will not interfere with existing recreational or navigational uses, cause unreasonable soil erosion, interfere with the natural flow of water, harm fish or wildlife, or lower the quality of any waters. If the water source is currently being utilized as a source of water supply by any water company or municipality, then a copy of the application for the permit should be forwarded to the company or municipality. If an application for a permit is denied the applicant may have a hearing within thirty days and within another thirty days appeal to the Superior Court. Anyone who engages in the prescribed activities without a permit will be punished with a fine of \$100-\$200 for each day in violation. Injunctive relief is also available to com-pel restoration of the affected area to its condition prior to the occurrence of the violation. (Sperling-Florida) W75-03698

WATER RESOURCES (AS AMENDED). Acts of the Kentucky General Assembly, H.B. 67, Approved March 28, 1974, effective June 21, 1974, p 480-485 (1974).

Water Law and Institutions—Group 6E

Descriptors: *Kentucky, *Legislation, *Water permits, *Administrative agencies, *Regulation, State governments, Irrigation, Water distribution(Applied), Water demand, Water supply, Industrial water, Administration, Water tutilization, Water law, Water resources, Injection wells, Oil industry, Steam turbines, Water allocation(Policy), Water policy. Identifiers: *Administrative regulations.

Kentucky legislation prohibits any person, business, or political subdivision from withdrawing or diverting public water from a stream, lake, groundwater source, or other body of water. Withdrawals and diversions have been allowed when accompanied by a permit. Permits are issued by the Department for Natural Resources and Environmental Protection, Division of Water Resources. No permit is required with the use of water for agricultural and domestic purposes. Neither will a permit be required when the amount withdrawn or diverted is less than an amount established by regulation. A permit is also not required for water used in steam generating plants or water injected underground for the production of oil and gas. All public water used pursuant to a permit must be recorded and a report submitted to the department. The willful failure to keep records shall subject the permit holder to possible revocation. (Sperling-Florida) W75-03699

DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY.

Arkansas Stat Ann, Vol 2, Title 5, Ch 9, sec 5-908, p 196-197 (Supp 1971).

Descriptors: *Arkansas, *Legislation, *State governments, *Environmental control, 'Administrative agencies, Regulation, Administration, Water law, Water policy, Environment, Conservation, Preservation, Ecology, Control, Pollution abatement, Water pollution control, Legal aspects, Law enforcement, Governmental interrelations, Management, Non-structural alternatives, Environmental effects, Resources development, Jurisdiction, Administrative decisions. Identifiers: Environmental policy, State policy.

There is hereby created an Arkansas Department of Pollution Control and Ecology. The head of the department shall be the Director of Pollution Control and Ecology, who shall be appointed by the Governor upon nomination by the Commission on Pollution Control and Ecology. The Director shall serve at the will of the Governor. The Pollution Control Commission and its functions, powers, and duties are transferred to the Department of Pollution Control and Ecology. There is hereby created a new Division of Environmental Preservation under this department. The new division shall be responsible for reviewing and making specific ecologically oriented recommendations on all plans, programs, and projects of all other state departments and agencies, and upon all federal actions affecting this state. The Director of the Department, with the advice and consent of the Governor, shall appoint the heads of the respective divisions. Each division shall be under the direction and control of the Director, and the Director may delegate his functions, powers, and duties to various divisions of the Department as he deems desirable. (Deckert-Florida) W75-03700

WATER MANAGEMENT DISTRICTS IN NORTH DAKOTA, E. K. Ayers, and R. E. Beck.

E. K. Ayers, and R. E. Beck. North Dakota Law Review, Vol 43, p 361-381, 1972 80 ref

Descriptors: *North Dakota, *Legislation, *Water management(applied), *Water policy, *Administrative agencies, Administrativo Management, Drainage programs, Irrigation programs, Eminent domain, Jurisdiction, Water

resources development, Water allocation(Policy), Watershed management, Planning, Regulation governments, Legal aspects, Water districts, Water conservation.

Identifiers: Administrative regulations, Dam effects, State policy.

Water management districts are meant to provide local guidance in dealing with the water management problems of a specific area. Their most typical problems are the removal of surplus water from agricultural lands, regulating flood waters, augmenting stream flow and constructing dams. In order to construct and maintain these projects, the water management district has the powers of eminent domain, to assess serviced property for moneys to pay for its services and to make rules and regulations concerning recreational, agricultural and industrial water use. Although water is not owned by the landowner, the North Dakota Century Code provides that the landowner receives preferential treatment in organizing or dissolving a water management district. The water management district is an adjunct to the State Water Commission, the Board of county commissioners, and the drainage districts. The latter's functions are to be absorbed into the water management district's functions. If a party is dissatified with a district's determination of the necessity of a particular project, he may contest the district's decision in a hearing before the State Water Commission. (Dillingham-Florida)

U.S. V. COLGATE-PALMOLIVE CO. (ACTION CHARGING UNLAWFUL DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS).

375 F. Supp. 962 (D. Kan. 1974).

Descriptors: *Water pollution sources, *Judicial decisions, *Navigable waters, *Rivers and Harbors Act, Water pollution, Industrial wastes, Waste water disposal, Waste water treatment, Sanitary engineering, Water quality, Water quality control, Rivers, Pollution abatement, Regulation, Water pollution control, Water resources development, Water law, Adjudication procedure. Identifiers: *Notice, *Liability(Legal aspects).

A soap manufacturer was charged with unlawfully discharging refuse matter into naviagble water in violation of Rivers and Harbors Appropriation Act. Defendant's plant manufactures soap and related products, the byproducts of which are discharged untreated into the Kansas River. Defendant's were warned that the discharges were in violation of Rivers and Harbors Act and have had ample time to comply with the requirements of the statute. The defendant has filed no application for a permit to discharge wastes. The government took samples of discharged materials to determine their environmental impact. Defendant contends that it was misled by alleged government representations that the government would use the samples taken only in civil proceedings for abatement and not in criminal prosecutions. The court determined that the defendant understood that noncompliance might result in both abatement proceedings and criminal prosecution. The court held that the wastes discharged were industrial and therefore not included in the exception to the prohibition against discharges made for some domestic wastes. (Proctor-Florida) W75-03702

CITY OF NEW YORK V. TRAIN (ACTION BROUGHT TO COMPEL RELEASE OF FUNDS AUTHORIZED UNDER FWPCA),

Descriptors: *Federal Water Pollution Control Act, *Allotments, *Financing, Economics, Administration, Decision making, Investigations, Judicial decisions, New York, Legislation, Adjudication procedure, Government finance, Economic aspects.

Identifiers: FWPCA Amendments of 1972, *Environmental policy.

Class action was brought by the City of New York on behalf of other municipalities against the Administrator of the Environmental Protection Agency to compel the allotments of funds authorized to be appropriated by the Federal Water Pollution Control Act. The Administrator contends that fund allotment is discretionary under the specific terms of the Act. The court examined the relevant statutory language and analyzed the pertinent legislative history in reaching a decision. It held that the specific section of the Act requires the Administrator to allot the full sums authorized to be appropriated. The decision of the trial court that the Administrator was not acting within his discretionary capacity was affirmend. (Proctor-Florida) W75-03703

STATE EX REL. MCLEOD V. MURRELL'S INLET CAMP AND MARINA, INC. (QUIET TITLE ACTION INVOLVING RIPARIAN LAND), 192 S.E.2d 199 (S.C. 1972).

Descriptors: *South Carolina, *Judicial decisions, *Coastal marshes, *Land fills, *State governments, Land development, Conservation, Land management, Water management(applied), Land use, Administration, Public land, Water law, Water policy, Legal aspects.

Appellant, State of South Carolina, claims jurisdiction over low marshes or tidal marshes that are inundated twice daily. Appellee had backfilled a marsh for its own private use. Appellee contended it had the right to fill because it owned the marsh. Appellee's contention was premised on its assertion that the marsh was not inundated twice daily, but only periodically, and that appellant had no valid claim. The appellant's motion for a direct verdict was denied by the trial court and the jury held for the appellee. The trial judge had excluded from evidence two plats of appellee's property, which identified the high water mark appellant wished to prove. On appeal the South Carolina Supreme Court affirmed the denial of a directed verdict because the issue was one of fact and therefore to be decided by the jury. The court also affirmed the exclusion of the plats from evidence. Since the plats were not drawn to depict the mean high water mark and so were irrelevant, they were properly excluded from evidence. (Barnes-Florida)

STATE OF MINNESOTA V. ENVIRONMENTAL PROTECTION AGENCY (ACTION OF IM-POUNDMENT OF FWPCA FUNDS), 1 Pollution Control Guide, Vol 3, paragraph 15011,

n 15122-15129, 1973.

Descriptors: *Judicial decisions, *Government finance, *Jurisdiction, *Administrative agencies, Administration, Budget, Economic aspects, Federal Water Pollution Control Act, Sewerage, Treatment facilities, Waste water treatment, FFederal government, *Minnesota, Legal aspects, Adjudication procedure.

Adjudication procedure. Identifiers: *Sovereign immunity, Impoundment(Legal aspects), Administrative regulations, FWPCA Amendments of 1972.

A federal district court in Minnesota held that the Environmental Protection Agency Administrator is required under the 1972 Amendments to the Federal Water Pollution Control Act to allot all sums Congress authorized to be appropriated, thereby making sums available for sewage treatment works construction approved for federal funding. The court explained whatever discretionary control over the funding of such projects the administrator may have is circumscribed by statutory language. The doctrine of sovereign im-

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munity does not bar the court from having jurisdiction where the allegation is that the adminis-trator acted beyond the scope of his authority. In an action for declaratory and injunctive relief, the constitutional requirement of a justiciable case or controversy proscribes hypothetical or political questions. By refusing to make a full allotment of Minnesota sewage treatment construction projects injuries are produced which are sufficiently concrete and interests are created sufficiently adverse to create a justiciable controversy. (Sperling-Florida)
W75-03705

POLLUTION ABATEMENT KENTUCKY

AUTHORITY, Acts of the Kentucky General Assembly, H.B. 560, Approved March 28, 1974, Effective June 21, 1974, p 552-556, 1974.

Descriptors: *Kentucky, *Legislation, *Treatment facilities, *Construction, *Government finance, Waste water treatment, Water pollution control, Economic aspects, Federal government, Adminis-Economic aspects, rederal government, Administration, Public health, Safety, Water resources, Adoption of practices, Water resources development, State governments, Waste treatment, Treatment facilities, Grants, Cost-sharing, Costs.

Identifiers: Administrative regulations, State pol-

The pollution of Kentucky's water resources has endangered the public's health and safety. To preserve the natural water resources, and the economic potential of the state, the state should assist governmental agencies so that waste water treatment works may be constructed. Federal law providing for grants for waste water treament works provides that in order to obtain maximum federal grant participation, a state must also furnish some aid. Without state aid, governmental agencies undertaking construction of waste water treatment works in the state must receive a smaller proportion of the necessary costs from the federal government. The Kentucky Pollution Abatement Authority will make the grants in a manner calculated to maximize the total amounts of federal grant participation received, or to be received. All governmental agencies are given power to undertake eligible projects, and to apply and receive state and federal grants. (Sperling-Florida)

INTERSTATE MINING COMPACT

AMENDED), Acts of Indiana, Public Law No 51, S. 65, Approved Feb. 12, 1974, Ch. 212, p 214-223, 1974.

Descriptors: *Mining, *Indiana, *Legislation, *Water quality control, *Interstate compacts, State governments, Water pollution sources, Public health, Safety, Mine wastes, Economic, Aspects, Water resources, Water pollution coordination, Soil structure, Standards, Water resources development, Interstate waters, Pollution abatement, Water law, Water policy. Identifiers: State policy, Environmental policy.

The effects of mining on the availability of water and other resources for other uses present problems which can properly be approached by considering the interests of those engaged in min-ing, those proposing to use these resources for other purposes, and the public. Variables such as soil structure and composition, physiography, climate, and the needs of the public make impractica-ble the application to all mining areas of a single standard. The state of Indiana has joined this interstate compact to advance the protection and restoration of water and other resources affected by mining. Other states will be assisted in their efforts to facilitate the use of resources affected by mining so that such use may be consistent with sound land use, public health, and safety. Assistance will also be given in the form of studies and recommendations, and techniques for the improvement, restoration or protection of water and other resources. (Sperling-Florida)

ENVIRONMENTAL PROTECTION ACT (AS

AMENDED), Acts of the Kentucky General Assembly, S.B. 242, Approved March 29, 1974, Effective June 21, 1974, p 445-449, 1974.

Descriptors: *Kentucky, *Legislation, *Planning, *Environmental sanitation, *Environmental effects, Cost-benefit analysis, Water resources, Water allocation(Policy), Water requirements, Water pollution sources, Pesticides, Water quality control, Radioactivity, Thermal pollution, Pollution abatement, Government finance, Monitoring, Federal government, State governments, Administrative agencies, Water resources development, Water quality control.

Identifiers: State policy, Environmental policy, Administrative regulations.

The Kentucky Department of Environmental Protection (DEP) has the authority to develop a comprehensive plan related to the environment Development which provides the best usage of land areas, maximizes environmental benefits, and minimizes the undesirable environmental effects will be encouraged. A program will be developed for the management of water resources to assure their protection, and to balance their utilization. The Department will provide guidelines for the prevention, abatement, and control of all water pollution including particulates, pesticides, radia-tion, and heated liquids. The DEP also has the power to administer grants of other funds or gifts om public and provate agencies including the federal government for the purpose of carrying out any functions of the department. The environment will be monitored to afford more effective and efficient control practices, to identify changes and conditions in ecological systems, and to warn of emergency conditions. (Sperling-Florida) W75-03709

COMMITTEE FOR THE CONSIDERATION OF THE JONES FALLS SEWAGE SYSTEM V. TRAIN (ACTION SEEKING INJUNCTIVE RE-LIEF RESTRAINING THE GRANTING OF SEWER HOOK-UP PERMITS), 375 F. Supp. 1148 (D. Maryland 1974).

Descriptors: *Water pollution sources, *Sewage, *Sanitary engineering, *Sewage effluents, Sewage treatment, Water pollution, Sewage disposal, Waste water disposal, Judicial decisions, Water quality, Water quality control, Water law, Water resources development, Adjudication procedure, treatment facilities, Federal Water Pollution Control Act trol Act.

Identifiers: *Injunction, *Nuisance(Lega aspects), FWPCA Amendments of 1972, *Immunity(Legal aspects), Private interest groups.

Action was brought by individuals and citizens associations for injunctive relief to restrain defendant city and Environmental Protection Agency (EPA) from granting permits for sewer hookups into the sewer system and requiring them to revoke certain existing hookup permits. Plaintiffs also sought an order to compel the Administrator of the EPA to require the owner or operator of any point source to maintain records, sample ef-fluents, and provide other information in ac-cordance with the Federal Water Pollution Control Act Amendments of 1972. The defendants, a private citizen and the Mayor and City Council of Baltimore submitted a motion to dismiss the complaint. The District Court held that the discharge permit application filed by the city for the waste water treatment plant included the sanitary sewer system and pumping stations for the purposes of the statute granting immunity from suit. The Court further held that the cause of action for public

nuisance would not extend to private plaintiffs. The plaintiffs would be allowed to amend the com-plaint to assert that discharges constituted an eminent danger to the health of persons under the FWPCA. (Proctor-Florida) W75-03710

YONGE V. ASKEW (CERTIORARI TO REVIEW DENIAL OF APPLICATION TO DREDGE NAVIGABLE WATERS), 293 So. 2d 395 (Fla. App. 1974).

Descriptors: *Florida, *Judicial decisions, *Dredging, *Permits, *Legal review, Administrative agencies, Environmental effects, Water development. Navigation, Rivers, water law, Legal aspects, Riparian rights, Water policy, Preservation, Water management (Applied), Land tenure, Water rights, Water utilization, State jurisdiction, Control, Adjudication procedure, Regulation, Environmental con-trol, Governments, Adoption of practices. Identifiers: Administrative regulations, Declaratory judgements, Environmental policy.

Petitioner landowner brought action seeking a writ of certiorari to review an order rendered by a state administrative agency, the trustees of which are respondents herein. The order denied petitioner's respondents neren. The order denied petutioner request for a permit to dredge three navigational connections into the Crystal River. The connections were part of petitioner's plans for development of 700 acres of uplands owned by the petitioner. The petitioner contended that the application met all requirements of law and therefore the respondents were mandatorily required to issue the permit as a ministerial duty. In the alternative, the petitioners contended that the respondents' sal to grant the permit was an abuse of discretion in that it was unsupportable by any competent or substantial evidence. The First District Court of Appeal ruled that the order rendered by the respondent was not subject to judicial review under the Administrative Procedure Act. In addition, the court ruled that the issuance of the permit was not a ministerial duty and that the petitioner had failed to meet its burden of showing that the works requested were in the public interest. Thus the denial was not an abuse of discretionary power. Certiorari was denied and petitioned dismissed. (Deckert-Florida) W75-03711

JONES V. SCOTT (ACTION CLAIMING PRESCRIPTIVE RIGHT IN PUBLIC OVER NAVIGABLE WATER).

509 S. W. 2d 831 (Sup. Ct. Ark. 1974).

Descriptors: *Arkansas, *Judicial decisions, *Prescriptive rights, *Public access, Water law, Land tenure, Legal aspects, State jurisdiction, Legal review, Public rights, Easements, Real proerty, Common law, Equity, Recreation, Navigaperiy, Common law, Equity, Recreation, is a viga-ble waters, Right-of-way, Adjudication procedure, Public rights. Identifiers: *Water rights(Non-riparians), *Public

trust doctrine.

Plaintiffs, appellees in this action, brought suit against the defendant landowner claiming prescriptive rights in public with respect to the use of a gravel bar outside a 30-foot right-of-way. The gravel bar had been used for more than 30 years for launching of boats, fishing, camping and other activities. Such use had continued until recently when defendant had erected a fence. The defendant contended that the use of the land had been permissive and not adverse. The trial court found no prescriptive right to camp, picnic, or fish, but did find a prescriptive right to launch boats. On ap-peal, the Supreme Court of Arkansas reversed the lower court and ruled that the evidence tended to show all use to be permissive on the part of the landowner and not of such frequency that the owner would be presumed to know that such usage was adverse. The court also ruled that the evidence failed to establish the navigability of the river and that a flowage easement obtained by the government in connection with construction of a dam did not give the public any right to use the dam did not give the public any right to use the land. (Deckert-Florida)

MILLER LAND CO., INC. V. LIBERTY TOWNSHIP (ACTION FOR INJUNCTION TO REMOVE DRAIN TILE AND RESTORE CONDI-TION OF LAND). 510 S. W. 2d 473 (Sup. Ct. Mo. 1974).

Descriptors: *Missouri, *Judicial decisions, *Surface drainage, *Drainage effects, *Adjacent land owners, Local governments, Drainage, Land tenure, Legal aspects, Water law, Common law, Equity, Legal review, Water manage-ment(Applied), Tile drainage, Engineering structures, Drainage practice, Drainage water, Repulsion(Legal aspects), Adjudication procedure, Administrative decisions.

Identifiers: *Injunctive relief, Common enemy rule, Water rights(Non-riparian).

Plaintiff, landowner, sought a mandatory injunction requiring the defendant township, and named members of its board, to remove drainage tiles which they had installed through an abandoned railroad bed and to refill and restore the bed to its natural height and condition. The defendants had installed the tiles at the request of an adjacent landowner, in order to drain off excess water which could no longer flow through the existing drainage ditch due to the installation of a stop gate by the adjacent landowner. This excess flowed onto the plaintiffs land. The trial court granted the injunc-tion and denied the defendant' motion for a new trial. The Supreme Court of Missouri affirmed. The court held that it was not a proper exercise of a township governmental functions to install tile on the boundary of the plaintiff's land to protect another party's land against surface waters drain-ing from a third party's land. (Deckert-Florida)

STATE UNIVERSITY SYSTEM OF FLORIDA SEA GRANT PROGRAM 1972. (1972). 24 p, 12 photo, 19 ref.

Descriptors: *Florida, *Government finance, *Research and development, *Estuaries, *Beaches, *Fishing, Shellfish, Mineral resources, *Estuaries, Harbors, Natural resources, Administration, Erosion. Water pollution effects, Pesticides, Water pollution sources, Recreation grants, Federal government, State governments, Water policy, Governmental interrelations.

Identifiers: Coastal zone management, Coastal waters, Administrative regulations, State policy.

Florida's natural environment is experiencing the stress that urban systems place on natural ecologi-cal systems. Florida is characterized by clear, tropical seas, productive estuaries, extensive sand beaches, fish, shellfish, mineral resources, and natural harbors and waterways. Sea Grant, with its basic mission of utilizing, understanding, conserving, and enhancing the nation's marine resources has provided a natural means for the universities to become more involved in evaluating pressures on these resources. This report covers progress made since the initiation of the State University System of Florida's union with the office of Sea Grant in 1972. Some of the specifics of research and advisory services in estuarine management, beach erosion, aquaculture, and the social studies are detailed. In 1972 research projects addressed the following areas: degradation of marine resources; chlorinated hydrocarbon pesticide influence on estuarine animals; economic evaluation of public recreation sites; and modeling of coastal localities to optimize human management of resources. (Sperling-Florida) W75-03714

THE NEW FEDERAL WATER POLLUTION

CONTROL LAW, George Washington Univ., Washington, D.C. For primary bibliographic entry see Field 5G.

OFFSHORE TERMINAL AUTHORITY. Louisiana Session Laws, Vol 3, Act No 358, approved July 12, 1974, p 662-669 (1974).

Descriptors: *Louisiana, *Legislation, *Offshore platforms, *Port authorities, *Administration, Harbors, Economic aspects, Coastal structures, Oil spills, Coastal engineering, Construction, Planning, Environmental effects, Monitoring, Regulation, Mississippi River, Tributaries, Navigation, Water pollution sources, Permits, Administrative agencies.

The Offshore Terminal Authority will plan, develop, construct, license, regulate, and operate offshore terminal facilities to promote the economic welfare of the citizens of Louisiana, and that area served by the Mississippi River and its tributaries. The Authority with incorporate the technological changes occuring in world and domestic shipping industries to increase efficiency and the flow of commerce through the terminal facilities. In addition to port operations, the Act will promote scientific and all other uses in the public interest. The Authority has exclusive and plenary power to issue licenses, certificates, and permits, and otherwise regulate all phases of the construction and operation by any person of offshore terminal facilities. Throughout all aspects of the Authority development program there will be in existence an environmental protection plan, which will include monitoring and operational guidelines for environmental protection. (Sperling-Florida) W75-03716

REPORT OF PROCEEDINGS AT PUBLIC HEARING CONCERNING THE RECLASSIFICATION OF VARIOUS STREAMS IN THE CAPE FEAR (LOWER SECTION), LUMBER, NEUSE AND WHITE OAK RIVER BASINS. North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Water and Air Resources.

For primary bibliographic entry see Field 4A. W75-03717

WATER QUALITY MANGEMENT PLANS-PROPOSED RULES.

Environmental Protection Agency, Washington,

Federal Register, Vol 38, No 99, p 13567-13571,

Descriptors: *Federal Water Pollution Control Act, *Regulation, *Planning, *State governments, *Adoption of practices, Federal government, Administrative agencies, Administration, Coordination, Decision making, Water quality control, Treatment facilities. Natural resources. Standards, Water resources, Water pollution control, Water management(Applied), Water conservation, Water utilization, Water treatment, Water allocation(Policy). Identifiers: *Administrative regulations, *Effluent

limitations.

Environmental Protection Agency has proposed regulations designed to assist the states in the preparation of water management plans. The Federal Water Pollution Control Act requires each state to have a continuing planning process for pollution control. The purpose of preparing basin plans is to provide the information which the states will need to make centralized coordinated water quality management decisions. Another purpose is to encourage adoption of water quality ob-jectives which take into account overall state policies and programs, including those for land use

and other related natural resources. The regulations describe the preparation of plans and the procedures governing plan adoption, submission, revision, and approval. The relationship of plans with agency grants and the national permit system is also described. Water quality will be classified according to the severity of the pollution. Federal properties, facilities, and activities are subject to ederal, state, interstate, and local standards and effluent limitations for control and abatement of pollution. (Sperling-Florida) W75-03718

BEAUNIT V. ALABAMA POWER CO. (ACTION AGAINST CORPORATION FOR LOWERING RIVER LEVEL BY DAM). 370 F. Supp. 1044 (D.C. N.D. Ala. 1974).

*Judicial decisions, Descriptors: *Alabama, *Judicial decisions, *Relative rights, *Natural flow doctrine, *Reasonable use, Land tenure, Federal jurisdic-Descriptors: tion, Discharge(Water), Water consumption, Water management(Applied), Water rights, Water law, Legal aspects, Riparian rights, Regulated flow, Water allocation(Policy), Water utilization, Rivers, Water quality control, Alteration of flow, Competing uses, Hydroelectric power, Adjudication procedure.

Identifiers: Nuisance(Legal aspects), Statute of limitations, Dam effects

Plaintiff lower riparian landowner sued defendant public utility for certain alleged property damage suffered by the plaintiff due to the defendant's operation of an upstream dam as a peaking power plant. The defendant's operation of the dam resulted in a decreased flow of water past the plaintif's property. The plaintiff contended that Alabama recognized his riparian right in the con-tinuous and uninterrupted flow of the river, and that the defendant was therefore liable for certain damages incurred by the plaintiff as a result of the decreased flow. The United States District Court disagreed, stating that the plaintiff would have a cause of action only if the defendant had been negligent in the operation of its dam or if such operation was not a 'reasonable use' of the river. The court found that the defendant's use of the river incident to its operation of the dam and generating facilities was a reasonable exercise of its riparian rights, and ruled that the plaintiff's cause of action for nuisance accrued more than one year before commencement of this action, and therefore was barred by the statute of limitations. (Deckert-Florida) W75-03719

GULF OIL CORPORATION, ET AL. V. MORTON (ACTION FOR WRIT OF MANDAMUS). 1 Pollution Control Guide, Vol 3, paragraph 15026, p 15232-15238, 1974.

Descriptors: *Leases, *Judicial decisions, *Legal review, *Water pollution sources, Decision making, Oil industry, Legislation, Drilling, Exploration, United States, Administrative agencies, Administration, Environmental effects, Continental shelf, Adoption of practices, Standards, Water pollution, Legal aspects, Administrative deci-sions, Water quality standards, Federal government, Exploitation.
Identifiers: *Administrative regulations.

A suit asked the court to declare invalid the Secretary of the Interior's order which suspended exploration and drilling operations on leaseswhich permit the recovery of mineral resources from the Outer Continental Shelf. The Secretary has the power to suspend operations under existing leases whenever he determines that the risk to the marine environment outweighs the immediate national interest in exploring and drilling for oil and gas. The scope of review requires an inquiry which identi-fies the range of choices available to an adminis-trative official and which determines whether on the facts the official's decision falls within that

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range. In this case drilling had not yet begun so the Secretary asked Congress to terminate certain leases and require their abandonment. A United States Geological Survey report indicated that the environmental risks involved in continued operation were unacceptable since the operations were subject to abandonment in the near future. The court held the Secretary's actions valid and in ac-cordance with law. (Sperling-Florida) W75-03721

GROUNDWATER USE ACT OF 1972. Code of Georgia Annotated, Title 17, Ch 17-11, secs 17-510 thru 17-521.2, p 21-31 (Supp 1972).

Descriptors: *Georgia, *Legislation, *Water resources, *Regulation, *Planning, Water supply, Water resources development, Waterutilization, Water requirements, Conservation, Groundwater, Sea water. Water demand. Administrative agencies, Adoption of practices, Pumping, Wells, Aquifers, Permit, Aquifer management, Water supply development, Water conservation, Environmental control.
Identifiers: *Environmental

*Administrative regulations.

The water resources of the state of Georgia should be put to beneficial use to fullest extent possible, subject to reasonable regulation. This regulation will be aimed at conserving these resources and to provide and maintain conditions which are conducive to the development and use of water resources. The Environmental Protection Division of the Department of Natural Resources will prepare proposed regulations concerning the use of groundwaters. Water users will submit reports concerning the quality of water used, the sources of water, and the nature of the use. Provisions will be made to protect against or abate saltwater encroachment, as well as adverse effects on other water users. Regulations concerning well depth, pumping levels, and pumping rates in wells or aquifers will be promulgated. Permits will be required for the use of groundwater in excess of 100,000 gallons per day. Procedures for obtaining the permit from the division, and the criteria the division should consider are described. (Sperling-Florida) W75-03722

U.S. V. CAPPAERT (ACTION BY U.S. TO HAVE ITS RIGHTS TO USE OF APPURTENANT WATERS DECLARED). 375 F Supp 456 (D Nev 1974).

Descriptors: *Nevada, *Fish, *Wildlife, *Fish conservation, *Fish populations, Judicial decisions, Wildlife conservation, Fish management, Water loss, Water management(Applied), Legal aspects, Landowners, Jurisdiction, Public rights, Water law, Water resources development, Parks, National parks, Recreation facilities, Conserva tion, Natural resources, Federal government, Adjudication procedure, Appropriation, Ground-water mining, Groundwater potential, Preservation. Identifiers: Environmental policy,

rights(Non-riparians).

Action was brought by the United States to have its rights declared to use the waters appurtenant to land known as Devil's Hole, Death Valley National Monument, to the extent that it is nece to maintain a pool and the desert pupfish therein. The government also seeks an injunction restraining landowners from pumping water except for domestic purposes. The plaintiff alleges that this excess pumping is detrimental to the water rights of the public and the survival of the pupfish. The defendants own lands and claim the water rights within the area near Devil's Hole, which claimed rights conflict with the claimed rights of the United States. The Federal District Court held that the patents to which the defendants trace their ownership to the lands surrounding the hole passed title to the land, but U.S. title is superior in time and right. It further held that the defendants pumping underground water had drawn water from underground sources which supplied Devil's Hole. This action threatened the survival of the pupfish. Since the public had an interest in protecting this endangered species, an injunction was granted (Sperling-Florida) W75-03723

TAXATION--EXEMPTION--PROPERTY USED FOR POLLUTION CONTROL OR WATER IM-POUNDMENT.

Iowa Legislative Service, Senate File 321, Vol 3, p 660-662, approved June 3, 1974 (1974).

*Legislation, Descriptors: *Iowa, Descriptors: *Iowa, *Legislation, *Impoundments, *Taxes, *Tax rates, *Assessments, *Water pollution, Treatment facilities, Water storage, Water pollution control, Permits, Adoption of practices, Administration, Regulation, Economic aspects, Water pollution control, Water treatment, Abatement, Water quality, Water quality control, Pollution abatement, Economics, Legal aspects. Identifiers: State policy, Administrative regulations.

A limited exemption from property taxation for property used to control air or water pollution and an exemption for certain property used for water impoundments are provided. The exemptions apply to new installations of pollution control property for a period of ten years beginning on January first after the construction of installation of the property is completed. The exemption will apply with respect to each of the ten annual assessments within the ten year exemption period and the property taxes payable on the basis of each of such ten annual assessments. This exemption is limited to the market value of the pollution control property. If the pollution control property is assessed with other property as a unit, this exemption is limited to the net market value added by the pollution control property. Exemptions for impound-ment structures and underlying land are available on application which will include a copy of the water storage permit approved by the water com-missioner of the Iowa natural resources council. (Sperling-Florida) W75-03724

ILLINOIS AND MICHIGAN CANAL. Smith-Hurd Annotated (Illinois), Ch 19, secs 8-47e, p 5-14, Supp 1972.

Descriptors: *Illinois, *Canals, *Legislation, *Administrative agencies, *Michigan, Basins, Dams, Navigation, Adoption of practices, Regula-*Legislation, tion, Decision making, State governments, Legal aspects, Water power, Leases, Construction, Water rights, Cost-benefit analysis, Governmental interrelations, Water law, Water manage-ment(Applied), Water resources development, Economic aspects, Interstate.
Identifiers: Administrative regulations, State pol-

The Illinois Department of Conservation has control and management of the Illinois and Michigan canal including feeders, basins, appurtenances, and locks, dams, and other improvements for navigation. The Department can prescribe reasonable rules and regulations in respect to all matters connected with the navigation and use of the canal, locks and dams, as well as traffic through them. The Department will establish reasonable toll rates for passage. The Department can lease to the highest bidder any water power and lands connected with the canal. No lease shall be for more than twenty years. All leases of water power are subject to the right of the Department to resume, without compensation to the lesee, the use of any such water power for the purpose of the canal. Also, the work by the construction of which created the water privilege may be abandoned or destroyed, whenever such work in the opinion of the legislature is no longer advantageous to the State. (Sperling-Florida)

WATER RECREATION ACT OF 1973.

Code of Georgia Annotated, Title 17, Ch 17-21, secs 17-1201 thru 17-1205, p 31-32 (Supp 1973).

Descriptors: *Recreation, *Water resources, *Georgia, *Legislation, Regulation, Natural resources, Water demand, Adoption of practices, Decision making, Administration, Economic aspects, Administrative agencies, Lakes, Watercourses, Legal aspects, Water resources development, Water management(Applied), Administrative decisions.

Identifiers: Administrative regulations, State policy, Liability(Legal aspects), Environmental pol-

Massive water-related recreational events may cause considerable damages to natural resources if improperly handled. The increasing popularity of water related recreation will cause in increase in the number and intensity of such events. A person sponsoring a water event in Georgia is to provide a bond. A water event is one that is advertised and likely to attract over five thousand people onto state waters other than lakes. The bond is to be provided to the Georgia Department of Natural Resources, not exceeding ten thousand dollars, issued by a surety company authorized to do business in the state. The Department is to be the sole judge as to the performance. All existing rights to bring a civil action for damages to person or pro-perty remain intact. (Sperling-Florida) W75-03726

UNITED STATES V. REPUBLIC STEEL CORP. (REFUSE DISCHARGE INTO NAVIGABLE WATERS).

1 Pollution Control Guide (Vol 3) paragraph 15034, p 15280-15282, 1974.

Descriptors: *Legal aspects, *Federal Water Pol-lution Control Act, *Rivers and Harbors Act, *Oil wastes, *Judicial decisions, Ohio, United States, Navigable waters, Adoption of practices, Administrative agencies, Water pollution control, Waste water disposal, Water pollution sources, Rivers, Water quality control, Industrial waste, Adjudication procedure, Legislation, Pollution abatement, Water policy.

Identifiers: Notice, Environmental policy, Refuse Act of 1899, Evidence.

The U.S. Sixth Circuit Court of Appeals recently affirmed the U.S. District for the Northern District of Ohio, holding that a corporation giving immediate notice to an agency of the federal government of a discharge of oil into navigable waters cannot be prosecuted by the use of such information. This use of information was precluded by a provision of the Federal Water Pollution Control Act. The purpose of the provision is to control water pollution by requiring immediate reporting of discharges of oil, and to provide an incentive for such reporting. The language of the Act was construed as protecting corporations as well as natural persons. A steel company had dumped coal tar into the Mahoning River. This was a violation of a provision of the Rivers and Harbors Act of 1899 which makes it unlawful to discharge any refuse matter of any kind into navigable waters of the United States. The Court granted the company's motion to suppress the notice it had sent to the Coast Guard informing the government of the discharge. The notice by the company was the only evidence of violation. (Sperling-Florida)

POLLUTANT SPILL PREVENTION AND CON-

TROL ACT (AS AMENDED).
Florida Sess Laws, Vol 4, Ch 74-336, p 812-822, approved June 27, 1974, effective July 1, 1974 (1974).

Descriptors: *Water pollution, *Water pollution sources, *Oil pollution, *Legislation, *Florida, Public health, Social aspects, Ships, Enforcement, Regulations, Legal aspects, Governments, Pollution abatement, Environmental effects, Pollution taxes(Charges), Water quality control, Water

quality standards, State governments.

Identifiers: Coastal waters, Coastal zone management, State policy, Environmental policy, Liability(Legal aspects), Effluent charges.

The act provides for the prevention and control of the discharge of pollutants in Florida. The legislature finds that the transfer of pollutants between vessels, between onshore facilities and vessels, and between offshore facilities and vessels is hazardous. The policy is to preserve the public use of navigable waters and to promote the general health, safety, and welfare. Provisions require registration certificates for all terminal facilities. The Department of Natural Resources is empowered to adopt and enforce regulations relating to the discharge of pollution into state waters and onto state coasts. Any person discharging effluents shall remove the pollutant. In the alternative, provisions for a department cleanup exist. A fund is established to provide monies for cleanup and rehabilitation after a pollutant has been discharged. An excise tax upon terminal facilities shall be levied to help maintain the fund. Any vessel or its agents which permits or suffers a prohibited discharge within state jurisdiction shall be liable to the fund for cleanup costs up to a fixed limit. Enforcement and penalties for violators are set forth. (Proctor-Florida)

PORT AUTHORITIES--ESTABLISHMENT. Missouri Leg Service, Vol 2, Act 88, HB No 1646, p 227-231, approved June 18, 1974 (1974).

Descriptors: *Missouri, *Legislation, *Port authorities, *Adoption of practices, *Administration, Legal aspects, Rivers, Economic authorities. aspects, Government finance, Kansas, Boundaries(Property), Navigable waters, State governments, Administrative agencies, Political aspects, Local governments, Governmental interrelations, Standards, Water law, Economic aspects, Regulation. Interstate waters. Identifiers: State policy.

The state of Missouri has authorized each city or county which has within its boundaries a navigable waterway to form a port authority. Upon the approval of the Director of the Transportation Commission of Missouri, the port authority will become a political subdivision of the state govern-ment. The Director is authorized to accept applications, conduct hearings, and approve or disapprove applications for creating city or county port authorities. Various criteria to be considered in passing upon the application are set out. Included in the criteria are: the population of the city or county submitting the application; the desirability or economic feasibility of having more than one authority in the same area; technical and economic capability to carry out port development; and the actual and potential river traffic and economic impact. Any application will be granted if the sub-division has a 300,000 population and a common boundary with the state of Kansas. (Sperling-Florida) W75-03729

INLAND LAKES PROTECTION AND REHA-BILITATION. Wisconsin Legis Service, Vol 2, Ch 301, AB 766, p

344-355, effective June 19, 1974 (1973).

Descriptors: *Lakes, *Eutrophication, *Planning, *Wisconsin, *Economic aspects, Recreation, Aesthetics, Environmental sanitation, Wildlife conservation, Public health, Water pollution, Water quality control, State governments, Local governments, Government finance, Water resources, Water law, Administration, Legislation, Water resources development, Surface waters, Water pollution control, Abatement. Identifiers: State policy.

Environmental values, wildlife, public rights in navigable waters, and the public welfare are threatened by the deterioration of natural lakes. The current state effort in Wisconsin to abate water pollution will not undo the eutrophic and other deteriorated conditions of many lakes. Lakes form an important basis for the state's recreation industry. The increasing recreational usage of the waters of this state justifies state action to enhance and restore the potential of the inland lakes. A state effort of research, analysis, planning, and financing, and a local effort undertaken by lake rehabilitation and protection districts of planning and plan implementation is necessary. The local districts will be formed by persons directly affected by the deteriorated condition of inland waters and willing to assist financially, or through other means, in remedying lake problems. (Sperling-Florida) W75-03730

POLLUTION CONTROL AWARDS PROGRAM. Florida Sess Laws, Vol 1, Ch 74-60, p 64-65, app May 22, 1974, effective-immediately (1974).

Descriptors: *Pollution abatement, *Air pollution, Descriptors: "Politution abatement," Air politution, "Water pollution control, "State governments, Environmental sanitation, "Water law, Environmental quality, Legislation, "Florida, Administration, Social aspects, Aesthetics, Water resources development, Political aspects, Water policy. Identifiers: Environmental policy, State policy.

A pollution control awards program is established to be administered by the Florida Department of Commerce. Awards may be granted to govern-mental or private entities for efforts in preventing or cleaning up of pollution as provided by the rules promulgated by the Department of Commerce Special awards may be given for outstanding effort and achievements in these endeavors. Awards fort and achievements in these endeavors. Awards or special awards may be presented in the categories of water pollution, air pollution, noise pollution and communication media on pollution problems. (Proctor-Florida) W75-03731

MERCURY, Bureau of Mines, Washington, D.C. Div. of Non-For primary bibliographic entry see Field 6C. W75-03797

CLIO NODS: ARIZONA V. CALIFORNIA AND THE BOULDER CANYON ACT - A REASSESS-

MENT, California Univ., Los Angeles. Dept. of History.

The Western Historical Quarterly, Vol III, No 1, p 17-51, January 1972, (California Water Resources Center Project UCAL-WRC-W-145).

Descriptors: *Water rights, *Federal-State Water Rights Conflicts, *Legal aspects, Streamflow, *Arizona, *California, *Interstate rivers. Identifiers: *Boulder Canyon(Ariz-Calif).

The Boulder Canyon Project Act of 1928 is reviewed in the light of implications of the decision in Arizona v. California, 373 U. S. 546 (1963). The decision increased the power of the federal government by declaring that Congress could di-vide the waters of interstate streams. The implications of this effect--and the possible misinterpretations that might have led to what may be a faulty conclusion—are reviewed. Whereas it has been generally believed that Arizona v. California has resolved and settled most of the conflict issues, it is suggested that possible misinterpretations of the original 1928 Act may lead to continued conflict and court actions. (Snyder-California, Davis)

ENFORCEMENT UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,

Environmental Protection Agency, Denver, Colo. Region VIII. For primary bibliographic entry see Field 5G. W75-03824

COSTS - EXERCISING EQUITABLE POWERS TO AWARD ATTORNEY'S FEES TO LOSING PARTY SEEKING COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY SIERRA CLUB V. LYNN, 364 F. SUPP. 834 (W.D. TEX. 1973),

G. Zunker. Land and Water Law Review, Vol 9, No 2, p 553-563, 1974.

Descriptors: Legal aspects, *Texas, Legislation, *Costs, Environment. Identifiers: *Environmental impact statements, *National Environmental Policy Act.

A recent federal district court case in Texas resulted in allowing a plaintiff who unsuccessfully challenged environmental impact statements prepared by the Department of Housing and Urban Development (HUD) for a housing development to recover his costs of litigation, including attorney fees. This holding is contrary to the general rule under which courts neither award attorneys' fees as a part of costs to the prevailing party, nor permit direct recovery of which fees as a part of damages. The allowance of such fees in Sierra Club v. Lynn was based upon recognized exceptions to the general rule due to the fact that the plaintiff in the case was acting as a 'private at-torney general' in seeking compliance with the National Environmental Policy Act and that there were overriding circumstances in view of the fact that the suit, although unsuccessful, encouraged remedial action by HUD and served to educate the public to the environmental implications of the proposed project. The court's holding is criticized in that the costs are awarded against the private land developer rather than HUD which is charged with statutory responsibility for the preparation of environmental impact statements. The statute bar-ring such recovery from HUD is viewed an an impediment to the internalization of social and economic costs generated by the inadequate stu-dies originally made by HUD. W75-03825

'PROJECT AQUA' IN POLAND, (IN POLISH), Polskie Towarzystwo Przyrodnikow im. Kopernika, Warsaw. For primary bibliographic entry see Field 2A. W75-03843

6F. Nonstructural Alternatives

THE NECESSITY OF ZONING VARIANCE OR AMENDMENTS NOTICE TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES UNDER THE SHORELAND ZONING AND NAVIGABLE WATERS PROTECTION ACT, McBurney, Musolf and Whipple, Madison, Wis. For primary bibliographic entry see Field 6E. W75-03364

RAPID CREEK FLOOD HAZARD ANALYSES-(INCLUDING INMAN CREEK AND WEST

Group 6F—Nonstructural Alternatives

CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO. Soil Conservation Service, Boise, Idaho

For primary bibliographic entry see Field 4A. W75_03438

ALTERING ALABAMA'S HISTORY, Soil Conservation Service, Auburn, Ala For primary bibliographic entry see Field 4A. W75-03688

6G. Ecologic Impact Of Water Development

CHANGES IN THE ECONOMY AND ECOLOGY AT PROPOSED LAKE SITES IN THE SALT RIVER BASIN, KENTUCKY, DURING EARLY CONSTRUCTION OF THE DAM FOR TAYLOR-SVILLE LAKE.

Kentucky Water Resources Research Inst., Lexington.

For primary bibliographic entry see Field 5C.

W75-03309

AMES RESERVOIR ENVIRONMENTAL STUDY, APPENDIX 1. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE STUDY. RESERVOIR SITE AND STREAM SYSTEM.

Iowa State Water Resources Research Inst.,

Ames; and Iowa State Univ., Ames. Engineering Research Inst.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 623, \$10.00 in paper copy, \$2.25 in microfiche. Vol 1, 343 p, 1973. OWRT A-999-IA(8a). DACW25-72-C-0033.

Descriptors: *Land management, *Recreation, *Iowa, Planning, *Land use, Environmental effects, Aesthetics, *Landscaping. *Ames Reservoir(Ia), Resource design.

A landscape overview of Iowa's Ames Reservoir site is presented in this report, one of several evaluating the social, economic and environmental impacts of the proposed reservoir. The first phase of the landscape overview was a visual analysis. The reservoir study was interpreted photographi-cally and by artists' sketches to show potential changes brought about by alternative reservoir configurations. In the second phase a computer bank of resource information pertinent to the project area was created. The data was programmed in computer graphics or tabular form to enable researchers to quantify and qualify patterns of resource changes resulting from the proposed project. The third phase utilizes the accumulated resource information to illustrate patterns of land types for various reservoir associated uses. The fourth phase was to quantify changes in timber resources associated with alternative reservoir resources associated with alternaute reservoir designs. Results of the study indicate that the 34 section study area contains 25% of the county's natural woodland. The proposed reservoir pool will inundate 15% of the county's natural woodland and 1.2% of the county's land area. The proposed landscapes would afford greater opporproposed landscapes would aftord greater oppor-tunity to recreate through more physical activities then are afforded now; but would yield a less diverse range of activities. (See also W74-11579, W74-11586, W74-11597, W74-11605, W74-11614, and W74-11623) (Schroeder-Wisconsin) W75-03318

POPULATION GROWTH, RESOURCE AVAILABILITY AND ENVIRONMENTAL QUALITY Resources for the Future, Inc., Washington, D.C.

For primary bibliographic entry see Field 6B. W75-03331

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS: A STAFF STUDY, Environmental Protection Agency, Washington, D.C. Office of Research and Development. For primary bibliographic entry see Field 5A. W75-03347

THE NASA ROLE IN MAJOR AREAS OF HUMAN CONCERN. Denver Research Institute, Colo. For primary bibliographic entry see Field 5A.

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS,

Delaware Univ., Newark. Academy of Natural Sciences; and Rutgers - the State Univ., New Brunswick, N.J. Work Group on Economic and Social Problems of the Delaware Estuary Region. P. G. Gosselink.

Report to NSF RANN Program, September 1973. 42 p, 2 fig, 24 tab, 13 ref.

Descriptors: *Rivers, *Delaware River, Water resources development, Planning, Recreation, Basins, *Water quality, *Estuaries, Delaware, New Jersey, Pennsylvania, New York.

Several social, economic, and environmental relationships are explored for the Delaware River basin. Secondary data is utilized to identify exist-ing conditions and trends and future research needs. The basin extends from Capes May and Henlopen to the Trenton, N.J., tidewaters. A review of natural characteristics and land use indicate basin landscapes are primarily composed of rolling hills and undulated lands. Nearly 50% of the total land area was in forest, 22% in cropland, and 10% in urban uses. Economic projections forecast that the basin's population and employment will double over the 1955-2010 period, with personal income quadrupling. The basin's ports also handled over 116,000,000 short tons of sea commerce in 1968. River quality varies with industrial effluents and oil releases from vessels and the surrounding seven refineries that contribute to the degradation. The basin provides over 137,000 acres of recreational land and water to service over 25 million recreationalists. Growing demand and already overtaxed facilities suggest the need for expansion. Design and cost configurations are projected to meet this demand under three alternative developmental goals. Social, economic, and environmental impacts of port development and electric plants addition are also noted. (Schroeder-Wisconsin) W75-03352

ENVIRONMENTAL POLLUTION RAPIDLY GROWING ECONOMY,

The Developing Economies, Vol 10, No 4, December 1972. p 479-495, 3 fig, 4 tab, 9 ref.

Descriptors: *Economic impact, *Environmental effects, *Pollution abatement, Industrial wastes, Industrial production. Identifiers: *Japan.

Environmental pollution in Japan has undergone radical changes since 1955. Pollution has come to affect increasingly greater areas and is causing damage not only to property, but to humans as well. Damage is no longer confined to direct inju-ries; secondary and tertiary damage in ecological terms have become increasingly important. Finally, pollution is viewed as a serious economic problem because of the rapidly rising social costs of environmental degradation. A number of factors have been associated with the rapid spread and rising complexity of environmental deterioration and resultant economic burdens in Japan since 1965: (1) increasing congestion in the Japanese economy; (2) shifts in Japan's industrial structures

to often more pollution prone industries; (3) greater sophistication of consumption resulting in greater refuse and (4) inadequate investments in social overhead capital. Projections for 1985 estimate that if trends continue, sulfate oxides, BOD and refuse levels will grow from 400,000 to 16,811,000 (1955-85) 543,000 to 16,977,000 (1955-85) and 24.9 to 78.9 million (1965-85) tons respec-85) and 24.9 to 78.9 million (1965-85) tons respectively. Greater pollution standards may lead to shifts in the industrial structure with machinery manufacturing increasing and oil refining and pulp industries declining. (Schroeder-Wisconsin) W75-03353

ENVIRONMENTAL DEFENSE FUND, INC. V. CORPS OF ENGINEERS OF THE UNITED STATES ARMY (ACTION TO RESTRAIN CORPS FROM FURTHER CONSTRUCTION OF NAVIGATION PROJECT).
FOR primary bibliographic entry see Field 6E. W75-03361

ENVIRONMENTAL DEFENSE FUND V. TEN-NESSEE VALLEY AUTHORITY (ACTION TO ENJOIN TVA FROM COMPLETING CON-STRUCTION OF TELLICO DAM). For primary bibliographic entry see Field 6E. W75-03362

ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION, Oak Ridge National Lab., Tenn. For primary bibliographic entry see Field 6D. W75-03399

TACNA MARSH. NATURAL AREA REPORT

Arizona Academy of Science, Tempe For primary bibliographic entry see Field 6B.

EVACUATION RISKS - AN EVALUATION, National Environmental Research Center, Las Vegas, Nev. J. M. Hans, Jr., and T. C. Sell. Report No EPA-520/6-74-002, June 1974, 166 p. 1 fig, 16 tab, 52 ref, 1 biblio, 8 append.

Descriptors: *Accidents, *Damages, *Hazards, Descriptors: "Accusents, "Damages, "Flazards, "Civil defense, "Radiation, Radioactivity, "Radioactivity effects, Lethal limit, Public health, Safety, Risks, Disasters, Evaluation, Population, Costs, Air pollution, Water pollution, Water pollution sources, Nuclear energy, Benefit-cost theory.

A study was conducted to assess the risk of death, injury, and cost associated with an evacuation of population groups affected by an incident at a fixed nuclear facility. Data and information were obtained by contacting persons and organizations involved with previous evacuations precipitated by natural or man-made causes and from available literature. Frequencies of 8.9 times 10 to the minus 8th power deaths per person-mile and 4.4 times 10 to the minus 8th power injuries per person-mile were derived from data representing vehicle evacuations involving approximately 5.5 times 100,000 persons. National Safety Council (NSC) data for motor vehicle accidents indicate frequencies of 2.4 times 10 to the minus 8th power deaths per person-mile and 9.0 times 10 to the minus 7th power injuries per person-mile. Because of the small number of deaths and injuries derived from the study of evacuations, no statistical comparison with NSC information could be made; however, strong subjective information suggests that NSC data can be used for estimating the risk of injury or death. (Houser-ORNL) W75-03424

RAPID CREEK FLOOD HAZARD ANALYSES (INCLUDING INMAN CREEK AND WEST FORK CREEK TRIBUTARIES) BANNOCK COUNTY, IDAHO.

Soil Conservation Service, Boise, Idaho. For primary bibliographic entry see Field 4A.

THE DELAWARE ESTUARY SYSTEM, EN-VIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. UPPER ESTUARY POL-ECONOMIC EFFECTS. UPPER ESTUARY POL-LUTION AND TRANSFER RELATIONSHIPS, Rutgers - the State Univ., New Brunswick, N.J. Work Group on Upper Estuary Pollution on Transfer Relationships. For primary bibliographic entry see Field 5B. W75-03440

THE DELAWARE ESTUARY SYSTEM, ENVIRONMENTAL IMPACTS AND SOCIO-ECONOMIC EFFECTS. DELAWARE RIVER ESTUARINE MARSH SURVEY, Academy of Natural Sciences of Philadelphia, Pa. Available from the National Technical Information

tion Service, Springfield, Va. 22161, as PB-229 781, \$7.00 in paper copy, \$2.25 in microfiche. Final Report (partial) to National Science Foundation, RANN Program, T. E. Walton III and R. Patrick, ed., Academy of Natural Sciences, Phildelphia, Pa. December, 1973. 174 p, 42 fig. GI-33369.

Descriptors: *Estuaries, *Estuarine environment, Marshes, *Marsh management, Management, *Water pollution, Wetlands, *Coastal marshes, *Aquatic habitats, Aquatic environment, Delaware, Marsh plants, Thermal pollution, Water pollution sources, Pollutants, Pollutants identification, Water quality, Water pollution effects, Pollution abatement, Environmental control, *Environmental effects, Ecology, Pennsylvania. Identifiers: *Delaware Estuary, *Philadelphia(Pa), Trenton(Del), Wilmington(Del).

Important marshlands in the Delaware Estuary are described in terms of their common emergent vegetation. Human activities that might disturb these marshes are also identified. Aquatic life in each marsh area was examined to determine the kinds of aquatic communities supported and disturbed. Throughout the upper part of the estua-ry, extending from Trenton to Wilmington, the emerging vegetation is characteristic of freshwater marshland. Examination of aquatic life in the upper estuary produced evidence of organic enrichment, and there were also indications of toxic pollution and/or periods of low dissolved oxygen concentration, evidenced by reduction in numbers of fish in upper estuarine waters. Effects of thermal pollution have not been identified yet. On the seaward side, aquatic flora and fauna approached more natural conditions, but there were sites showing pollution effects from sewage treatment plants, landfills, or industry. However, these impacts are local, not widespread. The upper part of the estuary is the severely impacted zone, with degradation greatest near Philadelphia. While natural marshland has been eliminated in the upper reaches, large natural marshes still support flora and fauna in the lower estuary. (See also W75-03440) (Grden-North Carolina) W75-03441

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. CONSTRUCTION SITE SELEC-TION, Hawaii Univ., Honolulu.

For primary bibliographic entry see Field 8A. W75-03443

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT), Army Engineer District, St. Louis, Mo. For primary bibliographic entry see Field 4A. W75-03452

UNNATURAL SHORELINE, California State Univ., San Francisco. Dept. of For primary bibliographic entry see Field 5G. W75-03459

FEDERAL ACTION FOR ENVIRONMENTAL PROTECTION AND ITS POTENTIAL SIGNIFICANCE FOR HOUSING. Rivkin/Carson, Inc., Washington, D.C. For primary bibliographic entry see Field 6E. W75-03485

TRANSLATIONS ON ENVIRONMENTAL QUALITY, NO. 7.

Joint Publications Research Service, Arlington, For primary bibliographic entry see Field 6E. W75-03486

LEGAL AND ECOLOGICAL ASPECTS OF THE INTERNATIONAL ENERGY SITUATION, Department of State, Washington, D.C.

I. D. Muir. International Lawyer, Vol 8, No 1, p 1-10, January

Descriptors: *Pollution sources, *Energy produc-tion, *Energy consumption, *Oil resources, *Environmental effects, *Natural resources, Environment, Technical problems, Radiation, Thervironment, Technical problems, Radiation, Ther-mal energy, Environmental impact, Oil pollution, Federal Quality Control Act, Legislation, Jurisdic-tion, Adoption of practices, Nuclear energy, Breeder reactors, Social benefits, Natural resources, Legal aspects, Oceans, Water resources development, Water law, Water policy, Identifiers: *International agreements, *Territorial

The current energy situation is to a considerable degree the result of increases in consumption and inclusion of ecological considerations in policy making. Production and consumption of energy are major sources of pollution. The increased consumption now projected for the immediate future will increase the incidence and magnitude of these environmental problems. Conflicts between environmentalists and industrialists over increased energy needs and environmental restrictions have spawned tension. The United States is increasing its dependence on foreign oil and this creates problems requiring international solutions. As oil prices rise, demands for increased use of coal, which is a major source of pollution, are heard. The development of nuclear energy for commercial use has also encountered environmental and technical problems relating to radiation release. It is hoped that the development of fusion technology will permit the use of seawater as an energy source. Considerable law has developed with respect to ecological considerations affecting hboring countries, including liability for oil pollution damage. These developments are in addition to actions taken by state and federal jurisdictions in the United States through the Federal Water Quality Improvement Act. (Sperling-W75-03490

ECOLOGY AND THE PROBLEM OF REHA-BILITATING WASTES FROM MINERAL EX-TRACTION. London Univ. (England). Dept. of Applied Biolo-

gy. For primary bibliographic entry see Field 5G.

A LOOK AT LEGISLATION DEFINING USES OF NATIONAL FOREST LANDS, PART TWO, For primary bibliographic entry see Field 6E. W75-03685

COASTAL ZONE MANAGEMENT IN MAINE: A LEGAL PERSPECTIVE, Maine State Planning Office, Augusta. Coastal Planning Group.
For primary bibliographic entry see Field 6E. W75-03689

HUMBOLDT HARBOR AND BAY JETTIES AND DREDGING, (FINAL ENVIRONMENTAL IN-PACT STATEMENT). Army Engineer District, San Francisco, Calif.

For primary bibliographic entry see Field 4A. W75-03706

COSTS - EXERCISING EQUITABLE POWERS TO AWARD ATTORNEY'S FEES TO LOSING PARTY SEEKING COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT. SIERRA CLUB V. LYNN, 364 F. SUPP. 834 (W.D.

For primary bibliographic entry see Field 6E. W75-03825

MICROCLIMATE AND THERMAL STRESS OF MAN IN AN ALEPPO PINE PLANTATION AND AN OAK SCRUB, Volcani Inst. of Agricultural Research, Ilanot

(Israel). Forestry Div. For primary bibliographic entry see Field 2I. W75-03834

7. RESOURCES DATA

7A. Network Design

REMOTE SENSING OF ALGAL BLOOMS BY AIRCRAFT AND SATELLITE IN LAKE ERIE AND UTAH LAKE,

National Environmental Satellite Service, Hill-For primary bibliographic entry see Field 5A. W75-03760

7B. Data Acquition

GAS CHROMATOGRAPHY OF VOLATILE METAL CHELATES: APPLICATION OF A NEW TECHNIQUE TO METAL ANALYSIS IN NATURAL WATERS, Illinois Inst. of Tech., Chicago. Dept. of Environ-

mental Engineering. For primary bibliographic entry see Field 5A. W75-03305

A DEVICE FOR MAINTAINING CONSTANT OXYGEN CONCENTRATION IN FLOWING WATER.

Colorado Div. of Wildlife, Fort Collins. For primary bibliographic entry see Field 5G. W75-03522

ESTIMATION OF GROUNDWATER ACCES-SION TO AND EVAPORATION FROM A SOUTH AUSTRALIAN LAKE USING ENVIRON-MENTAL TRITIUM, Commonwealth Scientific and Industrial Research

Organization, Glen Osmond (Australia). Div. of For primary bibliographic entry see Field 2H.

W75-03528

DETERMINATION OF LIQUID CONDUCTIVI-TY OF CAPILLARY POROUS SOLIDS, Waterloo Univ. (Ontario). For primary bibliographic entry see Field 2G.

Field 7—RESOURCES DATA

Group 7B—Data Acquition

MONITORING OF EARTH-ROCK DAMS, Snowy Mountains Engineering Corp., Cooma (Australia). Materials Branch. For primary bibliographic entry see Field 8D. W75-03533

AUTOMATIC DOSAGE OF SULFATES BY AN IMPROVED NEPHELOMETRIC METHOD (DOSAGE AUTOMATIQUE DES SULFATES PAR UNE METHODE NEPHELOMETRIQUE AMELIOREE),

Institut d'Hygiene et d'Epidemiologie, Brussels For primary bibliographic entry see Field 5A. W75-03536

ON THE CHOICE OF METHODS FOR THE PREDICTION OF THE WATER-ACTIVITY AND ACTIVITY COEFFICIENT FOR MULTICOMPONENT AQUEOUS SOLUTIONS, Ecole Polytechnique, Montreal (Quebec). Department de Genie Chimique. For primary bibliographic entry see Field 2K. W75-03540

USING AERIAL MEASUREMENTS OF FOREST OVERSTORY AND TOPOGRAPHY TO ESTI-MATE PEAK SNOWPACK,

Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station. For primary bibliographic entry see Field 2C. W75-03570

MEASUREMENT OF ATMOSPHERIC PRECIPITABLE WATER USING A SOLAR RADIOMETER,

National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center. For primary bibliographic entry see Field 2B. W75-03638

DIFFERENTIAL SEA-ICE DRIFT. II. COM-PARISON OF MESOSCALE STRAIN MEA-SUREMENTS TO LINEAR DRIFT THEORY

PREDICTIONS, Cold Regions Research and Engineering Lab., Hanover, N.H. For primary bibliographic entry see Field 2C. W75-03650

CALCULATION OF TEMPERATURE VARIA-TIONS OF SMALL MOUNTAIN STREAMS, Vrije Universiteit, Amsterdam (Netherlands). Dept. of Meteorology.
For primary bibliographic entry see Field 2E.
W75-03655

SUBGLACIAL GEOMORPHOLOGY SUR-ROUNDING THE ICE-FREE VALLEYS OF SOUTHERN VICTORIA LAND, ANTARCTICA, State Univ., of New York, Buffalo. Dept. of Geological Sciences. For primary bibliographic entry see Field 2C. W75-03667

IN SITU MEASUREMENTS OF LEAF WATER POTENTIAL AND RESISTANCE TO WATER FLOW IN CORN, SOYBEAN, AND SUN-FLOWER AT SEVERAL TRANSPIRATION

RATES, Atmospheric Environment Service, Downsview (Ontario).

For primary bibliographic entry see Field 3F. W75-03668

CHEMICAL ANALYSES FOR WATER QUALITY - TRAINING MANUAL. Environmental Protection Agency, Cincinnati,

Ohio. Water Quality Office. For primary bibliographic entry see Field 5A.

W75-03785

NEW MULTI-PROBE TEMPERATURE-PROFILE MEASUREMENT SYSTEM--THE 'THERMISTOR COMB', California Univ., Berkeley. Sea Water Conversion

Lab. For primary bibliographic entry see Field 3A. W75-03811

A SIMPLE DEVICE FOR ANALYZING THE ENERGY LOAD AND INTENSITY OF RAIN-STORMS, for Agricultural Research, Zaria Institute

(Negeria). For primary bibliographic entry see Field 2B. W75-03838

LEAF WATER CONTENT AND POTENTIAL IN CORN, SORGHUM, SOYBEAN, AND SUN-CORN, SE

Atmospheric Environment Service, Downsview (Ontario).

For primary bibliographic entry see Field 3F. W75-03839

7C. Evaluation, Processing and **Publication**

OF INTERACTIVE COMPUTER GRAPHICS GRAPHICS IN WATER PLANNING AND MANAGEMENT, RESOURCES Connecticut Univ., Storrs. Inst. Resources. For primary bibliographic entry see Field 6A. W75-03301

WATER QUALITY MODELS FOR URBAN AND SUBURBAN AREAS.

Nebraska Univ., Lincoln. For primary bibliographic entry see Field 5B. W75-03311

HYDROLOGIC INFORMATION STORAGE AND RETRIEVAL SYSTEM, North Carolina State Univ., Raleigh. Dept. of

Biological and Agricultural Engineering. E. H. Wiser.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 565, \$3.25 in paper copy, \$2.25 in microfiche. Annual Progress Report, June 30, 1974, 5 p. OWRT A-067-NC(1). 14-01-0001-3833.

Descriptors: *Data collections, *Data storage and retrieval, *Hydrologic data, Streamflow, Rainfall, Dams, Safety, Computer programs, Data processing, *North Carolina, Information retrieval.

HISARS, an acronym for Hydrologic Information Storage and Retrieval System, is an electronic digital computer system that stores, retrieves and analyzes streamflow, rainfall, temperature, snow fall, and evaporation data as recorded at numerous stations in North Carolina. Also included is the Register of Dams and Damsites of North Carolina. Meteorological data are being updated to include calendar year 1971 and the streamflow data is up-dated to September 1972. Operations in HISARS are divided into three main divisions: Access, Processing, and Management. The Management function enables the user to add new records and correct or modify stored records. The Access function provides for various listing of stored data and the Processing function provides a statistical analysis of the stored data. Included in the Processing function are standard statistical calcuations for daily values, monthly values, correlation analyses, frequency analyses, mass flow analyses and flow duration analyses. Data are

stored on magnetic disc packs. Updating of the stored on magnetic disc packs. Updating of the data base continues as the information becomes available. The HISARS program is written in PL-1. The system is operational on the IBM 370-165 computer at Triangle Universities Computer is Central to the Computer is the Magnetic Computer of the Computer of the Computer of the Computer is the Magnetic Computer of the Magneti available at the North Carolina Office of Water and Air Resources. (McJunkin-North Carolina W75-03316

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART I, Kansas State Univ., Manhattan. Dept. of Industri-

al Engineering.
For primary bibliographic entry see Field 5D.
W75-03387

ESTIMATION THEORETIC APPROACH TO ANALYSIS, SYNTHESIS, AND SOLUTION OF DYNAMIC SYSTEMS, PART II, Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5D.
W75-03388

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTA-TION MODULES AND CONSTRUCTION Hawaii Univ., Honolulu. Dept. of Ocean En-

gineering.
For primary bibliographic entry see Field 8A.
W75-03442

THE APPLICATION OF REPRO-MODELING TO THE ANALYSIS OF A PHOTOCHEMICAL AIR POLLUTION MODEL Technology Service Corp., Santa Monica, Calif. For primary bibliographic entry see Field 5B. W75-03633

SOME PREDICTED CLIMATIC EFFECTS OF A SIMULATED SAHARA LAKE, RAND Corp., Santa Monica, Calif. For primary bibliographic entry see Field 2B.

W75-03635

TWELVE BASIN INVESTIGATION: ANALYSIS OF POTENTIAL INCREASES IN PRECIPITA-TION AND STREAMFLOW RESULTING FROM MODIFICATION OF COLD OROGRAPHIC CLOUDS IN SELECTED RIVER BASINS OF THE WESTERN UNITED STATES. VOLUME 2, North American Weather Consultants, Goleta, For primary bibliographic entry see Field 3B. W75-03639

FITTING A THREE-PARAMETER LOG-NOR-MAL DISTRIBUTION BY LEAST SQUARES, Environmental Protection Agency, Athens, Ga. Southeast Water Lab. For primary bibliographic entry see Field 2E. W75-03651

ON THE VARIABILITY OF SEASONAL PARAMETERS IN HYDROLOGIC TIME SE-

Fittsburgh Univ., Pa. Dept. of Civil Engineering. For primary bibliographic entry see Field 2E. W75-03658

MULTIVARIATE STATISTICAL ANALYSIS OF Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie. For primary bibliographic entry see Field 2C. W75-03664

OPTIMAL IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS MEDIUM WITH QUADRATIC PROGRAMMING, California Univ., Los Angeles. Dept. of Engineering Systems.

primary bibliographic entry see Field 2F.

W75-03804

ON THE OPTIMAL IDENTIFICATION OF PARAMETERS IN A PARABOLIC SYSTEM, California Univ., Los Angeles. Dept. of Engineering Systems. primary bibliographic entry see Field 2F. W75-03805

8. ENGINEERING WORKS

8A. Structures

ECONOMIC EVALUATION AND DETERMINA-TION OF PLANT CAPACITY AND DAM HEIGHT,

Public Power Corp., Athens (Greece). For primary bibliographic entry see Field 6B. W75-03328

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTA-TION MODULES AND CONSTRUCTION

BARGE, Hawaii Univ., Honolulu. Dept. of Ocean En-

incering.

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as COM-74-11047, \$5.25 in paper copy, \$2.25 in microfiche. Technical Report No 5, UNIHI-SEAGRANT-CR-74-03. March, 1974. 105 p, 32 fig, 2 tab, 3 append, 8 ref. SG-2-35243.

Descriptors: *Computer programs, *Structural models, *Offshore platforms, Structural engineering, *Structural design, *Hawaii, Structural analysis, *Hydraulic structures, Programs, Data processing, Structures, Coastal structures, Shores, Architecture, Civil engineering, Construc-tion, Design, Stress analysis, Structural behavior, Bodies of water, Harbors, Engineering structures, Planning.

Identifiers: *Honolulu(Hawaii), *Floating City, Floating platforms, Flotation modules, Construc-

tion barges.

The preliminary structural sizing of modules for a proposed Floating City in Hawaii is presented. The City would be constructed aboard a large deep-sea floating platform and would house domestic, commercial, recreational, industrial, and public activities, linked to Honolulu by transportation and communication. Effects of draft, waterplane area, material strength, and weight distribution on sta-bility characteristics and structural design are discussed. Also considered are structural integrity, seakeeping, cost, and feasibility of the modules. Design and sizing of a construction barge is also required; it serves as a working surface, a transportation barge, and a loading platform. A computer program is developed to size the structure of the flotation chambers and module and to calculate stability characteristics of the individual modules and completed ring platform. Required inputs are standard flotation chamber dimensions, structural material, and weight distribution. The program varies the upper cylinder diameter, which program varies the upper cylinder diameter, which determines waterplane area. The final design configuration of the floating chamber uses 8,000 psi concrete, 240-feet draft, 62-foot upper cylinder diameter, and a 2:1 bottom aspect ratio. All results are shown in graphic form, and the program listing in smooth of the control of the water of the control of the contr is provided. (See also W75-03443) (Grden-North Carolina) W75-03442

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM, CONSTRUCTION SITE SELEC-TION, Hawaii Univ., Honolulu.

R. M. Kontingsberger, and S. B. Ribakoff.

Available from the National Technical Information Service, Springfield, Va. 22161, as COM-74-11046, \$4.25 in paper copy, \$2.25 in microfiche. Technical Report No 6, UNIHI-SEAGRANT-CR-74-04, 1974. SG-2-35243.

Descriptors: *Offshore platforms, *Structural engineering, *Structural design, *Environmental effects, *Hawaii, Land use, Structures, Coastal structures, Shores, Construction, Civil engineering, Design, Bodies of water, Harbors, Planning, Comprehensive planning, Sites, Locating, Urbanization, Environment, Oceans, Islands, Water resources, Cities, Floating. Point(Hawaii).

Barber's Identifiers: Oahu(Hawaii), *Floating City, Floating platforms, Floating modules, Honolulu(Hawaii).

Criteria for selecting a construction site for a Floating City in Hawaii are presented. The city would be constructed aboard a large, deep-sea floating platform and would house domestic, commercial, recreational, industrial, and public activities, linked to Honolulu by transportation and communication. Criteria include: adequate area of sheltered water; channel negotiable by the constuction barge; access to skilled labor force, transportation and capital resources; and minimum environmental consequences. Three adequate sites were located - Kawaihae on Hawaii, Port Allen on Kauai, and Barber's Point on Oahu. Barber's Point is preferred since a deep draft harbor is needed and is being planned, the district is zoned for heavy industry, no incompatible land uses exist, and the site is on Oahu, where most of the State's capital and human resources are located. Arguing for another site, however, is the non-existence of the harbor and the continued lopsided trend toward high density and overdevelopment on Oahu. If financing for a deep harbor cannot be obtained independently of the project, other sites will be less expensive since they possess suitable harbors. (See also W75-03442) (Grden-North Carolina) W75-03443

PVC SEWER PIPE MEETS TIGHT SPECIFICA-

Public Works, Vol 105, No 7, p 84, July, 1974.

Descriptors: *Plastic pipes, *Sewers, Construction materials, Delaware, Water pollution control, Treatment facilities, Design.

Identifiers: *PVC sewer pipes, New Castle County(Del).

Twenty-five sewer construction projects are underway in New Castle County, Delaware, in anticipation of a rise in population. Johns-Manville Ring-Tite PVC sewer pipes in 8-inch to 12-inch sizes are being selected due to their availability and reliance in meeting the strict infiltra-tion/exfiltration limitations. Also the pipe's light weight and 20-foot lengths allow trenches to be opened and closed quickly. (Sandoski-FIRL) W75-03547

EVALUATING WELL CONSTRUCTION, (PART II), Agricultural Research Service, Beltsville, Md.

For primary bibliographic entry see Field 5B. W75-03813

NEW RUBBER EXPANSION JOINTS FOR PIPELINES.

For primary bibliographic entry see Field 8G.

8B. Hydraulics

PREDICTING THE FLOW OF WATER WITHIN A CHANNEL BOUNDARY OF GRAVEL, Mississippi State Univ., State College. Dept. of

Agricultural and Biological Engineering. Y. K. Tang.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-238 636, \$4.25 in paper copy, \$2.25 in microfiche. Ms Thes-is, May 1973. 50 p. 10 fig, 5 tab, 12 ref, append. OWRT A-057-MISS(2).

Descriptors: *Open channel flow, *Boundaries(Surfaces), *Porous media, Free sur-Descriptors: faces, Gravels, Flow, Channel erosion, Flumes, Velocity, Shear, Slopes, Gradients(Streams), Protection, Darcys law, Chezy equation, Mannings equation, Regression analysis, Roughness(Hydraulic), Reynolds number, Porosity, Particle size, Laboratory tests. Identifiers: Flow depth, Average discharge velocity, Seepage velocity.

An empirical relationship was developed describing the discharge velocity of water flowing within a channel boundary of gravel as a function of the gravel size, channel slope, and flow depth above a gravel layer of uniform thickness of 4.5 inches. The nature of the function was determined from the analysis of laboratory observations. The laboratory tests were conducted in a 50 ft long, 1 ft wide, and 1 ft deep rectangular channel. Observations were made by varying one independent variable and holding the other independent variables constant. Three sizes of gravel ranging between 0.25 and 1.5 inches in diameter, six channel slopes between 0.00125 and 0.00750, and six flow depths between 0.5 and 5.5 inches were used. The discharge velocities within the gravel layer were measured with a hot-film anemometer. Multiple regression techniques were utilized to obtain the prediction equation. The analysis of variance and the coefficient of determination showed that the prediction is a good predictor. (Visocky-ISWS) W75-03320

SEWER PIPE: INFILTRATION IS THE ISSUE, For primary bibliographic entry see Field 5D. W75-03548

MIXING AND TRANSPORT, (LITERATURE REVIEW).

Delaware Univ., Newark. Dept. of Civil Engineer-

For primary bibliographic entry see Field 5B. W75-03554

HYDRODYNAMIC EFFECTS ON FLOW THROUGH SCREENS AT INTAKES,

Bechtel, Inc., Gaithersburg, Md.

A. M. Alsaffar. Water Research, Vol 8, No 9, p 617-622, September 1974. 7 fig, 10 ref.

Descriptors: *Screens, *Fish barriers, *Head loss, *Intakes, Hydraulics, Drag, *Hydrodynamics, Continuity equation, Velocity, Momentum equa-tion, Flow resistance, Fish conservation. Identifiers: Grids.

Screens placed at intakes to protect fish were investigated. The effects of approach velocity, wire area, and screen angles less than 90 degrees to the flow were considered. Equations were developed for the pressure drop coefficient and for the flow angle downstream from the screen. These parame ters were found to depend on the drag coefficient and the three conditions initially considered.
Results were presented in a form useful for design of fish protective screens at intakes. (Adams-W75-03659

Field 8—ENGINEERING WORKS

Group 8B—Hydraulics

ANTI-HEAVE PROTECTIVE SYSTEM,

Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France). (assignee) J. E. Lamy.

US Patent No 3,849,990, 4 p, 17 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Shore *Pollution *Breakwaters. abatement. Waves(Water), Offshore platforms, Oil industry,

Identifiers: Wave effects, *Heave effects, Port facilities, Offshore facilities, Submarine deposits, Underwater mining.

A wall is provided with projecting studs arranged in staggered relation. The studs are adapted to slow ascending and descending water flows against the wall exposed to wave and heave action. Circulation-generating fluid deviations and end ed-dies are introduced. The stude can consist of pipes dies are introduced. The studs can consist of pipes draining water through the apertures of a per-forated wall of a breakwater of a perforated caisson type. (Sinha-OEIS) W75-03732

MECHANICAL REEF, For primary bibliographic entry see Field 2J. W75-03738

ANTI-EROSION DEVICE,

For primary bibliographic entry see Field 2J. W75-03742

BOUNDARY EFFECTS ON DILUTION OF

BUOYANT JETS, Memorial Univ. of Newfoundland, St. John's. Faculty of Engineering and Applied Science.

J. J. Sharp, and G. Wang.

In: Water Pollution Research in Canada 1973, Vol

8, p 168-177, 6 fig, 8 ref.

Descriptors: *Jets, *Waste dilution, *Outfall sewers, Coasts, Mixing. Identifiers: Buoyant jets.

Large marine outfalls are laid on the ocean bed with jets discharging horizontally at right angles to the pipe axis. When first installed the jet discharges at a distance above the bed equal to half the pipe diameter but subsequent current scour may bring the jet into much closer proximity with the floor, or in soft sediments, with time, the jets will discharge at or below the sea bed level. The dilution achieved in a single jet under such conditions was investigated with resultant conclusions that the dilution of a buoyant jet discharged in close proximity to a horizontal floor, is con-siderably greater than that obtained in a free jet. The magnitude of the increase in dilution varies depending on the values of relevant parameters but comparisons indicate that an increase in the order of 200% to 500% would not be uncommon. As the jet leaves the discharge nozzle it tends to cling to the floor before rising, thus changing the shape of the trajectory and increasing dilution. The implications are that, for the type of ocean outfall described, settlement of the discharge pipe due to scour will have a beneficial effect on the dilution achieved between outfall and surface. (See also W75-03770) (Auen-Wisconsin) W75-03780

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA, Chevron Research Co., Richmond, Calif. C. D. McAuliffe.

Journal of Petroleum Technology, Vol 25, p 727-733, June, 1973. 10 fig, 3 tab, 16 ref.

Porosity, *Emulsions, Descriptors: Groundwater, Oil reservoirs, Drilling fluids, Injection wells, Sandstones, Penetration, Heterogeneity, Displacement, Capillary action, Asphalt, Viscosity, Drops(Fluids), Equipment, Flow, Permeability, Cores, Saturated flow. Identifiers: *Oil-in-water emulsions, Porous media, Emulsion flow, Waterfloods, Oil recovery, Producing wells, Fingering, Jamin effect, Crude oil, Droplets, Pseudo non-Newtonian flow.

In waterfloods, the rapid channeling of water from in water 100ds, the rapid channeling of water from injection to producing wells through the more permeable portions of the reservoir gives low oil recovery. Laboratory investigations were undertaken to determine the properties of oil-inwater emulsions and to study the flow of emulsions through porous media. Samples of core material can be considered as miniature reservoirs and the contraction. and the cores are heterogeneous. The following conclusions were drawn: (1) Crude oil-in-water emulsions can be easily prepared from some asphaltic crude oils and dilute solutions of sodium hydroxide. (2) Emulsions containing up to 50% oil have viscosities in bulk that are less than 20 times that of water, even though the oil viscosities may range up to 1 million cp at room temperature. (3) Emulsions prepared from various asphaltic crude oils have droplets of different sizes. (4) Oil-inwater emulsions can effectively reduce the water permeabilities of sandstone cores if the initial water permeabilities are less than 2 darcies. (5) The permeability reduction caused by injecting emulsion is retained even when the emulsion is followed by many pore volumes of water. (6) Flow of oil-in-water emulsions through porous media is pseudo non-Newtonian, regardless of how much oil the emulsion contains. (7) In these experiments, with cores of different permeabilities mounted in parallel, oil-in-water emulsion proportionally reduced the permeability in high-permeability cores more than in cores of lower permeability. (Campbell-NWWA) W75-03812

8C. Hydraulic Machinery

HOW DO YOU EXPLAIN THE COST, LFE Control System Industries, Santa Clara, Calif. For primary bibliographic entry see Field 6C. W75-03333

PACKAGED PUMPING STATIONS FOR SUB-URBAN WATER DISTRIBUTION, For primary bibliographic entry see Field 5F.

COLUMBIA DRAINAGE AND LEVEE DISTRICT NO 3, MONROE COUNTY, ILLINOIS (FINAL ENVIRONMENTAL STATEMENT), Army Engineer District, St. Louis, Mo. For primary bibliographic entry see Field 4A. W75-03452

TALKING TANKERS. For primary bibliographic entry see Field 5E. W75-03560

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA. Chevron Research Co., Richmond, Calif. For primary bibliographic entry see Field 8B. W75-03812

8D. Soil Mechanics

MONITORING OF EARTH-ROCK DAMS, Snowy Mountains Engineering Corp., Cooma (Australia). Materials Branch. A. D. Hosking. Australian Geomechanics Journal, Vol G4, No 1, p 1-12, 1974. 14 fig, 15 ref.

Descriptors: *Design data, *Instrumentation, *Monitoring, *Rockfill dams, Dam design, Design criteria, Dams, Dam construction, Earth dams, Reservoir operation, Pressure measuring instruments. Strain measurement. Seismic properties. Structures, *Australia.

Identifiers: Snowy Mountains Hydroelectric Scheme(Aust).

Dams are monitored during construction to check on the predictions of design factors and allow for modification of designs where necessary, and during their operational life to ensure their safety, and determine the effects of operational practices and external influences. Data are also derived for the design of future dams. The data required are principally related to neutral and total stresses, and to movements and strains; the response of the dam to seismic shock may also be required. The types of instruments employed, both embedded and surface-installed, are reviewed and discussed. An outline of methods of presenting the data obtained is provided, with illustrative examples covering several of the earth-rock dams of the Snowy Mountains Scheme. The frequency of observa-tions is discussed. (Levick-CSIRO) W75-03533

STRUCTURAL BEHAVIOR OF A FLEXIBLE METAL CULVERT UNDER A DEEP EARTH EMBANKMENT USING METHOD

BACKFILL, California State Div. of Highways, Sacramento. Bridge Dept. D. W. Spannagel, R. E. Davis, and A. E. Bacher.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 589, \$7.00 in paper copy, \$2.25 in microfiche. Report No CA-Hy-BD-624111-73-6, June 1973. 220 p, 120 fig, 13 tab, 17 ref, 1 append. D-4-24.

Descriptors: *Culverts, *Embankments, *On-site data collections, *Design, *Backfill, Structural design, Engineering structures, Roads, Highways, Instrumentation, Structural behavior, Investigations, Analytical techniques, Evaluation, Prototype tests, Earth pressure, Stress, Stress analysis, Hydraulic structures, Soil mechanics, Soil pressure, Steel pipe.

Identifiers: Flexible culverts, Structural-steel plate pipe.

A culvert consisting of twin 108-inch-nominaldiameter structural steel plate pipes was buried under 160 feet of highway embankment at Apple Canyon using Method A (soil) backfill. Two crosssections were extensively instrumented to determine soil pressures, displacements, strains, and settlements at various fill heights and following construction completion. Results indicated that the soil pressures were linear functions of fill height and produced fairly uniform peripheral distributions. Displacements were small. Stresses exceeding the specified minimum yield were observed without apparent structural damage. Theoretical analysis procedures were applied to the installation to determine their relative merit. The finite element procedure proved the best, although sufficient soil property data were not available to predict accurately pipe displacements and stresses. Comparisons were made between this installation and a similar structural plate pipe at Chadd Creek using Method B (baled straw) backfill. The Method A backfill technique was found to be superior to Method B due to the uniformity of pressures, stresses, and moments obtained. (Humphreys-ISWS) W75-03641

Fisheries Engineering—Group 81

8E. Rock Mechanics and Geology

EFFECT OF FLUID CONTENT ON THE MECHANICAL PROPERTIES OF WESTERLY GRANITE.

Univ., Livermore. Lawrence Liver-California

For primary bibliographic entry see Field 5B. W75-03428

A GEOLOGICAL AND SEISMOLOGICAL IN-VESTIGATION OF THE LAWRENCE LIVER-MORE LABORATORY SITE,

California Univ., Livermore. Lawrence Livermore Lab.

For primary bibliographic entry see Field 5B. W75-03429

8F. Concrete

HAWAII'S FLOATING CITY DEVELOPMENT PROGRAM. STRUCTURAL SIZING OF FLOTA-TION MODULES AND CONSTRUCTION

BARGE, Hawaii Univ., Honolulu. Dept. of Ocean Engineering.

For primary bibliographic entry see Field 8A. W75-03442

TESTING AND EVALUATION OF PROTOTYPE

TUNNEL SUPPORT SYSTEMS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. W. Parker, D. U. Deere, R. B. Peck, P. C.
Birkemoe, and R. M. Semple.
Available from the National Technical Informa-

tion Service, Springfield, Va 22161 as PB-231 912, \$9.50 in paper copy, \$2.25 in microfiche. Report No UILU-ENG 73 2013, August 1973. 320 p, 109 fig, 23 tab, 48 ref, 4 append. DOT FR-20020.

Descriptors: *Tunnels, *Laboratory tests, *Tunnel linings, *Concrete technology, Testing, Evaluation, Concrete additives, Concrete testing, Concrete mixes, Prototypes.

Concrete mixes, Flototypes.
Identifiers: *Tunnel supports, *Large scale tests,
Steel fiber, Regulated-set concrete, Precast
polymer concrete segments.

Presented were the results of engineering studies related to the development of new and improved tunnel support systems. Steel fiber reinforced regulated-set concrete was proposed for use as a slipformed concrete lining which can be placed immediately behind a tunnel boring machine. Mix design studies and field pumping tests for this new concrete were described. The results of a cooperative research effort carried out with the U.S. Bureau of Reclamation on precast polymer concrete segmented tunnel support systems included an evaluation of the structural aspects of the system, an analysis of potential heat and fire hazards, and an evaluation of the cost of the promising new support system. The design, construction, and opera-tion of a large-scale test facility to test both circular and horseshoe-shaped tunnel supports with a span of 10 feet were described. These tests are ex-pected to result in the adoption of more effective and economical liners and supports. Large-scale tests which will evaluate the structural behavior of steel fiber regulated-set concrete were described. These tests are being conducted in connection with the development of an extruded liner tunneling system. (Humphreys-ISWS) W75-03644

8G. Materials

BENEFICIATION OF LIGNIN SOLUTIONS AND

PULP MILL WASTES, Betz Labs., Inc., Trevose, Pa. (assignee) For primary bibliographic entry see Field 5D.

W75-03593

STRUCTURAL BEHAVIOR OF A FLEXIBLE METAL CULVERT UNDER A DEEP EARTH **EMBANKMENT** USING

BACKFILL, California State Div. of Highways, Sacramento. Bridge Dept. For primary bibliographic entry see Field 8D.

TESTING AND EVALUATION OF PROTOTYPE TUNNEL SUPPORT SYSTEMS.

Illinois Univ., Urbana. Dept. of Civil Engineering. For primary bibliographic entry see Field 8F. W75-03644

HYDROGEN EVOLUTION ON BETA III TITANIUM ALLOY,

California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 2K. W75-03809

OIL-IN-WATER EMULSIONS AND THEIR FLOW PROPERTIES IN POROUS MEDIA, Chevron Research Co., Richmond, Calif. For primary bibliographic entry see Field 8B. W75-03812

NEW RUBBER EXPANSION JOINTS FOR PIPELINES.

Water Services, Vol 18, No 935, p 21, January,

Descriptors: *Expansion joint *Pipelines, Design data, Flexibility. joints, *Rubber. Identifiers: United Kingdom.

Rubber expansion joints for pipelines are being marketed in the United Kingdom by United Flexible Metallic Tubing Company, Limited. The joints are available in a variety of qualities of rubber and can be fitted for aggressive chemicals. They have a strong multi-ply nylon fabric carcass with wire reinforced collars and a weather proof external cover. Sizes range from 32-300 mm bore. The over length is 130 mm. Total axial movement possible is plus or minus 30 mm from the normal free length. Maximum lateral offset is from 20-30 mm depending on diameter. The joints provide a versatile and economic means of achieving flexibility in pipelines conveying fluids under pressure or vacuum. All forms of movement can be compensated for, and they also serve to dampen vibra-tions and prevent the transmission of noise. W75-03819

8H. Rapid Excavation

SELECTED PHYSICOCHEMICAL PROPER-TIES OF BASALTIC ROCKS, LIQUIDS, AND

Los Alamos Scientific Lab., N. Mex. M. C. Krupka.

Available from the National Technical Informa tion Service, Springfield, Va. 22161, as Rept. No LA-5540-MS; \$4.00 in paper copy, \$2.25 in microfiche. Report No LA-5540-MS, March 1974. 11 p, 18 fig, 9 tab, 27 ref.

Descriptors: *Basalts, *Physicochemical properties, *Physical properties, *Chemical properties, *Thermodynamic behavior, *Rock properties, *Liquids, *Melting, Radioactivity, Research and development, Viscosity, Density, Thermal capacity, Thermal conductivity, Geothermal studies, Thermal expansion, Mechanical properties, Specific heat, Waste disposal, Systems analysis. Identifiers: *Glasses.

Rock-melting systems are under development. Based on the concept of progressive localized melting of the rock encountered in forward motion and subsequent chilling of the melt to a glass, these systems, when fully developed, have the potential of contributing significant improvements to the general field of excavation technology. Selected physicochemical properties of basaltic rocks, liquids, and glasses are presented including viscosity, thermal diffusivity, thermal conductivity, specific heat, density, thermal expansion coefficient, and average chemical composition. (Houser-ORNL)
W75-03419

81. Fisheries Engineering

FINANCING RESOURCES FOR FISHERY DEVELOPMENT.

Inter-American Development Bank, Washington, D.C.

For primary bibliographic entry see Field 6C. W75-03339

EXPANSION AND EVALUATION OF AN AR-TIFICIAL REEF OFF MURRELL'S INLET, SOUTH CAROLINA,

National Marine Fisheries Service, Beaufort, N.C. Atlantic Estuarine Fisheries Center. For primary bibliographic entry see Field 6C. W75-03348

COMMERCIAL OYSTER FISHERY DEVELOP-MENT INVESTIGATION,

Hawaii State Dept. of Land and Natural Resources, Honolulu. For primary bibliographic entry see Field 6C. W75-03350

THE TRANSITION FROM SMALL-SCALE TO LARGE-SCALE INDUSTRY, United Nations Development Program, Lagos

(Nigeria). For primary bibliographic entry see Field 6C. W75-03351

THE ROLE OF AQUACULTURE IN FISHERY DEVELOPMENT AND MANAGEMENT, Food and Agriculture Organization of the United Nations, Rome (Italy). Dept. of Fisheries. For primary bibliographic entry see Field 6C. W75-03355

ALTERNATIVES IN AQUACULTURAL DEVELOPMENT: CONSIDERATION OF EX-TENSIVE VERSUS INTENSIVE METHODS, National Marine Fisheries Service, Galveston, Tex. Biological Lab. For primary bibliographic entry see Field 6B. W75-03398

FOOD SELECTION BY LABEOROHITA (HAM.) AND ITS FEEDING RELATIONSHIP WIT OTHER MAJOR CARPS, Aligarh Muslim Univ. (India). Dept. of Zoology.

Rashid A. Khan, and A. Qayyum Siddiqui. Hydrobiologia, Vol 43, No 3/4, p 429-442, 1973,

Ildentifiers: Algae, *Carps, Catla-catla, Cirrhina-mrigala, Crustacea, Growth, *Labeo-rohita, Phytoplankton, Ponds, Protozoa, Rivers, Rotifers, Vegetation, Zooplankton, Fish ponds, *Fish food organisms.

Selectivity of food by L. rohita was studied in a stocking pond (Moat), by calculating an electivity index (E) for each food organism as described by Ivlev. L. rohita was definitely selective in its feeding. In case of fingerlings, there was a strong selection for zooplanktonic organisms (Arcella and Dif-

Field 8-ENGINEERING WORKS

Group 81—Fisheries Engineering

Keratella and among protozoans, flugia among protozoans, Keratella and Brachionus among rotifer and Daphnia and Cyclops among crustaceans) and smaller algae (Cosmarium and Closterium among desmids, Euglena and Volvox among phytoflagellates and algal spores and zygotes) while most of the phytoplanktonic organisms, belonging to green algae, diatoms and blue green algae, were avoided. In case of adults, a strong negative selection was observed for all zooplanktonic organisms and a strong positive selection for most of the green strong positive selection for most of the green strong positive selection for most constraint algae and diatoms (Ankistrodesmus, Zygnema, Selenastrum, Pediastrum, Selenastrum, Tetraspora, Stephanodiscus, Scenedesmus. Naviculla, Diatoma, Synedra and Nitzchia). However, all blue green algae were avoided. The feed-ing relationship of L. rohita with other major carps, Cirrhina mrigala and Catla catla was studied in 2 different habitats, pond and river. The adults of L. rohita fed mainly on phytoplankton and macrovegetation, the main food of adult C. mrigala was decayed organic matter, sand and mud supplemented by plankton, while the food of adult C. catla was chiefly composed of zooplankton, and some phytoplankton.--Copyright 1974, Biological Abstracts, Inc. W75-03496

OBSERVATIONS ON A BREEDING PAIR OF TILAPIA RENDALLI RENDALLI BOULENGER 1896 IN AN EXPERIMENTAL TANK AT LAKE KARIBA FISHERIES RESEARCH INSTITUTE.

D. H. S. Kenmuir. Hydrobiologia, Vol 43, No 3/4, p 365-370, 1973,

Identifiers: *Breeding, Climates, Fisheries, Lakes, *Rhodesia(Lake Kariba), Temperature, *Tilapia-rendalli-rendalli, Weeds, *Fish ponds, Fish management.

A pair of breeding T. r. randalli were installed in a tank at the Lake Kariba Fisheries Research Institute (Rhodesia) in order to determine the number of times they would breed in a yr under Kariba climatic conditions. The pair bred almost monthly from Jan. until May, when temperatures in the tank dropped below 20C, the minimum temperature at which this species will breed. Breeding commenced again in Sept., when temperatures were above 20C and continued monthly to the end of the yr. A total of 8 breedings in the calendar yr of 1971 were recorded. T. rendalli could breed at least 8 times a yr in the Lake. This represents a considerable capacity for increase and in view of the destructive weed-eating habits of T. r. rendalli effort should be made to find a way to crop this species, which is not effectively caught by gill nets.--Copyright 1974, Biological Abstracts, Inc. W75-03501

THE PLANKTON OF NEW TRANSFER-PONDS AT THE GOLYSZ FARM,

Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.

L. Krzeczkowska-Woloszyn.

Acta Hydrobiol, Vol 15, No 4, p 427-436, 1973, Illus.

Identifiers: Algae, *Carp production, *Fertilization, *Phytoplankton, *Poland(Golysz Farm), Ponds, *Zooplankton, Fish ponds, *Fish transfer ponds, Fish foods, Fish management. Identifiers: *Carp production, kton. *Poland(Golysz

Earlier investigations are continued on the plankton of the 1st and 2nd transfer-ponds in the 1st yr after their construction (for carp production). It discusses the development of plankton with the application of another type of fertilization. The ob-served changes in the phyto- and zooplankton indicate a structure more consistent with that occurring in water bodies utilized for a longer time. The analyses of the fertilization did not reveal any inanalyses of the fertilization did not reveal any in-fluence on the numbers of plankton. Among other factors, some role was probably played by its com-position, chiefly among the algae.—Copyright 1974, Biological Abstracts, Inc. W75-03502 HYDRODYNAMIC EFFECTS ON FLOW THROUGH SCREENS AT INTAKES,

Bechtel, Inc., Gaithersburg, Md. For primary bibliographic entry see Field 8B. W75-03659

FLOATING WATER SCREEN, FMC Corp., San Jose, Calif. (assignee) R. G. Bottorf.

U.S. Patent No. 3,843,520, 5 p, 7 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 927, No 4, p 1637, October 22, 1974.

Descriptors: *Patents, Water treatment, *Screens, *Fish barriers, *Fish conservation, Equipment, Conservation, Water level fluctuations. Identifiers: *Ice formation, *Fish screens, Floating water screens.

A floating water screen installation for use in bodies of water in which the water level varies comprises an anchoring structure on the bed of such a water body. It includes a fixed vertical hollow central column and an outlet pipe in communication with the column. A buoyantly supported generally cylindrical screen structure, having an enclosed bottom, is mounted in a surrounding relationship to the column for vertical sliding motion on the column in response to changes in water level, and for rotation about the column. Long vertical slots are provided in the central column to admit only screened water to the outlet pipe. Ro-tary drive and screen backwash systems are also cribed. One object of this device is intended to be the protection and conservation of fish. This is accomplished by the provision of a screening structure with a low velocity water flow through the screen areas to permit fish to swim away and the elimination of pockets and areas in which the fish may be trapped. Additional objects include the provision of rotating drives which reduce ice formation around the floating screen structure and multiple removable screen panels for simplified maintenance and repair. (Sinha-OEIS) W75-03745

MARINE FISH CULTURE IN BRITAIN: IX. GROWTH OF CULTURED PLAICE TO MAR-KETABLE SIZE IN THE LABORATORY Marine Biological Station, Port Erin, Isle of Man

A. B. Bowers

Cons Cons Int Explor Mer. Vol 35, No 2, p 149-157. Illus 1974.

Descriptors: Europe, Sea water, Fish, *Fish management, Fish populations, Fish reproduction, *Fish growth.

Identifiers: Great Britain, *Plaice, Pleuronectes-Platessa.

Plaice (Pleuronectes platessa) were reared in un-heated sea water in the laboratory through 2 generations. Selected 2nd generation plaice were measured and weighed every 2 mo. One group of fish cultured at a density of 13 fish/m2 of tank area fish cultured at a density of 13 fish/m2 of tank area gave a yield of 11.6 kg of marketable plaice 21 mo. from hatching for a food consumption of 56 kg. Plaice cultured in laboratory tanks grew faster than wild plaice in the sea and were heavier for their length. Seasonal variations in growth of cultured plaice were similar to those shown by wild plaice in the sea.—Copyright 1974, Biological Abstracts Inc. stracts. Inc.

AN ELECTRICAL BARRIER FOR PREVENTING MIGRATION OF FRESHWATER CRAY-FISH IN RUNNING WATER: A METHOD TO STOP THE SPREAD OF THE CRAYFISH PLAGUE.

Uppsala Univ. (Sweden). Inst. for Physiologic

T. Unestam, C. Nestell, and S. Abrahamsson. Rep Inst Freshwater Res Drottningholm 52, 199-203, Illus. 1972. Descriptors: *Water pollution control, Fish control agents, *Crayfish, Aquatic animals, Aquatic life, Crustaceaus, Electronic equipment, Europe, Freshwater, Rivers, Running waters, Streams, Fish barriers, Barriers, Fish migration. Identifiers: Astacus-astacus, Sweden.

The electronic device described was tested in a stream of the River Tidan, Vastergotland, Sweden. Crayfish up to 1 m from the device were paralyzed; since the plague fungus survives only several weeks after all crayfish have succumbed, the time necessary to maintain the barrier is short.--Copyright 1974, Biological Abstracts, Inc. W75-03833

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

PUBLICATIONS LIST OF THE IDAHO WATER RESOURCES RESEARCH INSTITUTE.
Idaho Univ., Moscow. Water Resources Research

For primary bibliographic entry see Field 10C.

W75-03321

SEA GRANT PROGRAM 1973, STATE UNIVER-SITY SYSTEM OF FLORIDA. Florida Univ., Gainesville. Marine Advisory Pro-

gram. (1973). 24 p, 12 photo, 2 tab, 26 ref.

Descriptors: *Florida, *Government finance, *Estuaries, *Research and development, Comprehensive planning, Economics, Decision-making, Grants, Projects, Water resources development, Federal government, State governments, Local governments, Fisheries, Fishing, Fish management, Environmental effects, Coasts, Resources development, Economic aspects, Wetlands, Coastal marshes, Conservation.

Identifiers: Coastal waters, Coastal zone management. State policy.

Research has contributed information to decisions such as the Florida state purchase of coastal lands, siting of a sewage outfall and an oil well, cutting an inlet, and redesigning a commercial fishing trawl. Increasing the number of participating universities to five, developing closer ties with other marineoriented organizations, and establishment of a quality publications series, all strengthened Sea Grant in Florida. Research concerning estuarine management, fisheries resources, ocean engineering, and aquaculture is reported. Research was done on some Gulf coast estuaries to develop information to decide how to balance the many uses of these areas. Florid's fisheries resources make possible a far-flung economic enterprise with local, state, national and international interests. Three projects were designed to provide information for the harvesting, handling, and utilization of renewable fisheries resources. (Sperling-Florida) W75-03720

9B. Education (In-House)

CHEMICAL ANALYSES FOR WATER QUALI-TY - TRAINING MANUAL.

Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office. For primary bibliographic entry see Field 5A.

9C. Research Facilities

TWENTY YEARS OF WORK ON SOLAR DISTILLATION AT THE UNIVERSITY OF CALIFORNIA,

California Univ., Berkeley. Sea Water Conversion Lab.

For primary bibliographic entry see Field 3A. W75-03810

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

PUBLICATIONS LIST OF THE IDAHO WATER RESOURCES RESEARCH INSTITUTE. Idaho Univ., Moscow. Water Resources Research

Available from the National Technical Informa-tion Service, Springfield, Va 22161, as PB-238 633, \$4.25 in paper copy, \$2.25 in microfiche. Research Report, April 1974. 44 p, 1 append. OWRT A-999-IDA(5).

Descriptors: *Publications, *Water Resources Institute, *Bibliographies, Information retrieval, *Research and development, Indexing, Documentics, *Indexing, Documentics, *Indexing, Documentics, *Indexing, Documentics, *Indexing, Documentics, *Indexing, tation, *Idaho.

The various publications, thesis and papers prepared in conjunction with the Idaho Water Resources Research Institute activities were listed. All entries listed are either contained in the listed. All entries listed are either contained in the Institute's Reading Room or in the project file. Some of the publications are available free of charge, but photo copies of all publications are available at five cents per page. To assist in referring to any particular report or group of reports, the listing was subdivided into four basic categories: OWRR allotment projects, OWRR matching grants, Title II grants, and Miscellaneous publications. Each entry was referenced in both an author index and a research category index. A detailed description of the FCST research category descriptions was provided as an appendix to explain the use of the research category index. It was hoped that these publications will increase the exchange of ideas, that interest in water related research and training will be encouraged, and that academic cooperation and communication with all interested parties will be enhanced as a result of interested parties will be enhanced as a result of the added knowledge on water and its manage-ment. (Scott-ISWS) W75-03321

MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. PROTOZOA: CILIOPHORA, New Hampshire Univ., Durham. Dept. of Zoolo-

For primary bibliographic entry see Field 05C. W75-03787

10F. Preparation Of Reviews

DISINFECTION. Texas Univ., Houston. For primary bibliographic entry see Field 05D. W75-03369

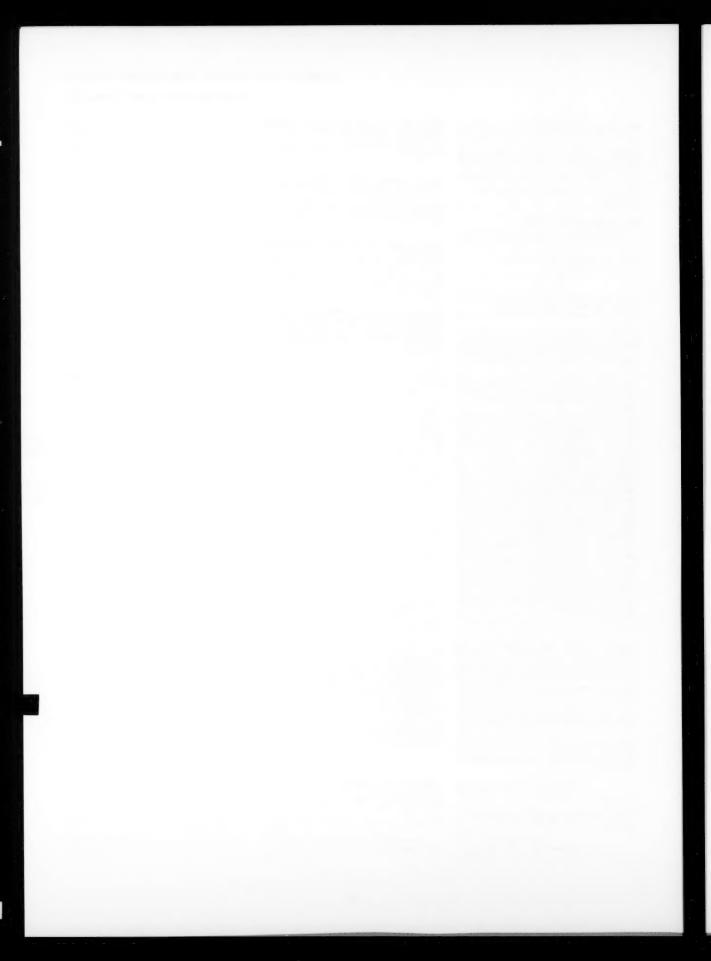
ANAEROBIC DIGESTION OF ORGANIC MATTER. Rowett Research Inst., Bucksburn (Scotland) For primary bibliographic entry see Field 05D.

STATE OF THE ART-ACTIVATED CARBON TREATMENT OF WASTEWATER, CH2M-Hill, Reston, Va. For primary bibliographic entry see Field 05D. W75-03545

URBAN RUNOFF AND COMBINED SEWER OVERFLOW, (LITERATURE REVIEW), National Environmental Research Center, Edison, N.J. Edison Water Quality Research Div. For primary bibliographic entry see Field 05D. W75-03553

MIXING AND TRANSPORT, (LITERATURE REVIEW). Delaware Univ., Newark. Dept. of Civil Engineering. For primary bibliographic entry see Field 05B. W75-03554

THE USE OF AEROBIC PROCESSES FOR THE STABILIZATION OF ANIMAL WASTES, North of Scotland Coll. of Agriculture, Aberdeen. For primary bibliographic entry see Field 05D. W75-03555



2-4-D Monitoring 2,4-D Residues at Loxahatchee National Wildlife Refuge,	ACTIVATED SLUDGE Experimental Optimization of a Step Aeration Waste Treatment Process,	Commonwealth v. Washington Township (Action to Order Compliance with Clean Streams Law).
W75-03506 5A	W75-03322 5D	W75-03468 6E
ABATE INSECTICIDE	Bacterial Production of Enzymes in Activated	Jewett v. Redwater Irrigating Association
Control of Salt-Marsh Mosquitoes with Abate Insecticide at Coombabah Lakes, Queensland,	Sludge Systems, W75-03380 5D	(Action for Adjudication of Water Rights). W75-03471 6E
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Salt Tolerance in the Wild Relatives of the Cul- tivated Tomato: Water Balance and Abscisic	High Rate Biological Denitrification Using a	W75-03473 6E
Acid in Lycopersicon Esculentum and L. Peru- vianum Under Low and High Salinity,	Granular Fluidized Bed, W75-03382 5D	Commonwealth of Kentucky, Department of Highways v. Fitzpatrick (Eminent Domain Ac
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Accumulation, Distribution, Transformation	W75-03564 5D	ADMINISTRATION
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Cadmium Uptake by Wheat from Sewage	Facilities.	W75-03463 6E
Sludge Used as a Plant Nutrient Source: A Comparative Study Using Flameless Atomic	W75-03565 5D	Development Management Description for Florida
Absorption and Neutron Activation Analysis,	A Review of Turbidity Removal Associated	Regulatory Management Programs for Florida Marine Fishermen,
W75-03503 5A	With Biological Treatment of Paper Mill Waste-	W75-03487 6E
Investigations on the Incorporation of Different	waters, W75-03574 5D	Water Strategy Paper Highlights EPA Policies.
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tion).	the Syavsk (Wood-Pyrolysis) Combine	People Ex Rel Gazlay v. Murray (Action to En join Filling Parcel of Submerged Land).
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W75-03705 6E	Removal of Trace Metals from Waste Water by Treatment with Lime and Discarded Automo-	W75-03310 5B
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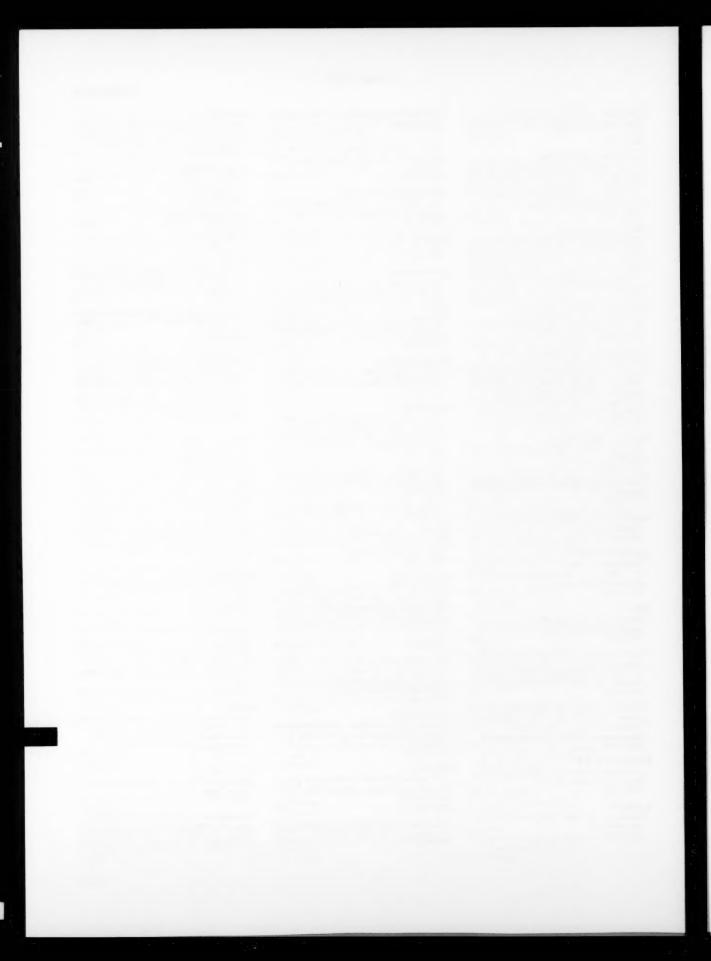
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- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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